THE OIL WEEKLY

ENGINEERING « NEWS » STATISTICS

EDITORIAL STAFF

WARREN L. BAKER
Editor

J. KENT RIDLEY
Managing Editor

ASSOCIATE EDITORS

L. J. LOGAN — WM. V. GROSS

DISTRICT EDITORS

B. F. LINZ.....Washington
J. V. HIGHTOWER.....New York
BEN ALTMAN, FRANK TAYLOR.....Tulsa
H. H. KING.....Fort Worth
EARL S. POST.....San Antonio
R. W. BYRAM.....Austin
Z. H. MISCHKA, ELTON STERRETT, GILBERT M. WILSON.....Houston

PUBLISHED BY

THE GULF PUBLISHING COMPANY

HOUSTON, TEXAS

R. L. DUDLEY, *President*
A. L. BURNS, *General Manager*
S. W. ROBINSON, *Editorial Director*
TOM W. NELSON, *Advertising Manager*

Staff correspondents at all important points.

Member Audit Bureau of Circulation
Member Associated Business Papers, Inc.

BRANCH OFFICES

NEW YORK.....250 Park Ave.
PITTSBURGH.....Vandergrift Bldg.
CHICAGO.....332 S. Michigan Ave.
LOS ANGELES.....W. W. Wilson Bldg. Huntington Park, Calif.
TULSA.....Hunt Bldg.
FORT WORTH.....W. T. Waggoner Bldg.
SAN ANTONIO..Smith Young Tower Bldg.
WASHINGTON.....Albee Bldg.

ADVERTISING STAFF

DICK SWINSKY.....New York
C. A. WARDLEY.....Pittsburgh
H. G. FITZPATRICK.....Chicago
J. F. CARTER, JR.....Tulsa
JAY CURTS, JR.....Los Angeles
CHAS. WYATT.....Houston

CIRCULATION DEPARTMENT

J. T. WAGONER.....Manager

SPECIALIZED OIL JOURNALS

Published by

THE GULF PUBLISHING COMPANY

The Oil Man's Calendar

APR.	
1- 3	Society of Exploration Geophysicists, Houston.
2- 4	American Association of Petroleum Geologists, Twenty-sixth Annual Meeting, Houston.
3- 4	Society of Economic Paleontologists and Mineralogists, Houston.
7-11	American Chemical Society, St. Louis.
15-17	Southwest Gas Measurement Short Course, University of Oklahoma, Norman.
16-18	Western Petroleum Refiners Association, Hot Springs, Ark.
17-18	American Petroleum Institute, Division of Production, Eastern District, Pittsburgh.
23-25	Petroleum Industry Electrical Association, Tulsa.
23-25	Natural Gasoline Association of America, Dallas.
24-25	National Petroleum Association, Semi-Annual Meeting, Cleveland.
MAY	
2- 3	Petroleum and Natural Gas Conference, State College, Pa.
5- 8	American Gas Association, Natural Gas Section, Dallas.
10-11	West Texas Geological Society, Spring Field Trip, Fort Worth.
19-22	American Petroleum Institute, Mid-Year Meeting, Tulsa.
NOV.	
2- 7	American Petroleum Institute, Annual Meeting, San Francisco.

Contents « March 31, 1941

Volume 101, Number 4

The Changing Panorama 21

Feature Section:

New Skill Will Determine Future of Oil Prospecting 22
By E. DEGOLYER

Drilling and Reserves 25

How Would the Public Benefit? 25

Stratigraphic Exploration and Future Discoveries 26
By V. E. MONNETT

Technical Evaluation of Petroleum Geology 31
By O. L. BRACE

Wildcat Drilling in 1940 More Successful 37
By FREDERIC H. LAHEE

Organization and Administration of Geological Departments 41
By SHIRLEY L. MASON

Geophysical Prospecting Follows Varied Pattern 45
By E. A. ECKHARDT

Analysis of Mud Returns Locates Oil and Gas Zones 49
By ELTON STERRETT

Core Analysis Presents Inclusive Formation Data 59

A. P. I. Estimates Half Billion Barrel Gain in United States Reserves 65

Practical Hints for the Drilling Rig 66

News Section and Index 69

Looking Ahead With the Editors 2

Editorial Comment 25

Notes for the Equipment Buyer and User 117

Squeaks From the Bull Wheel 115

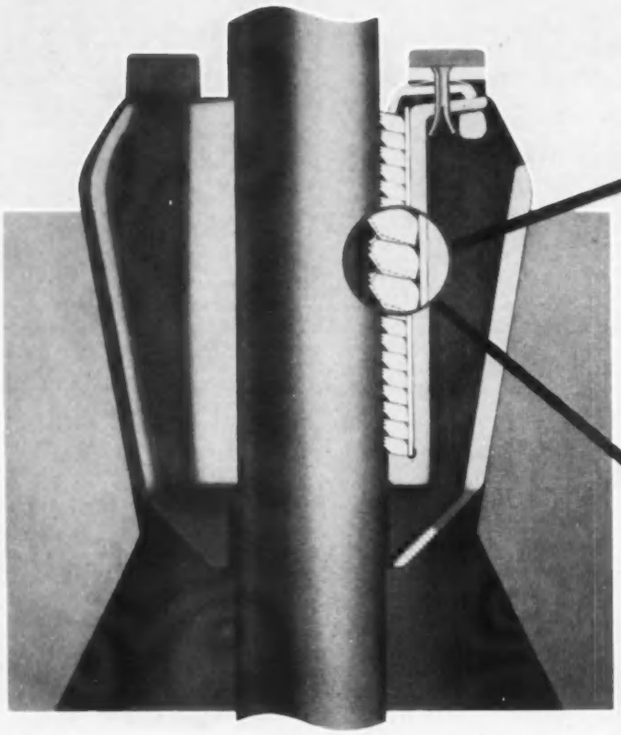
Index to Advertisers 120

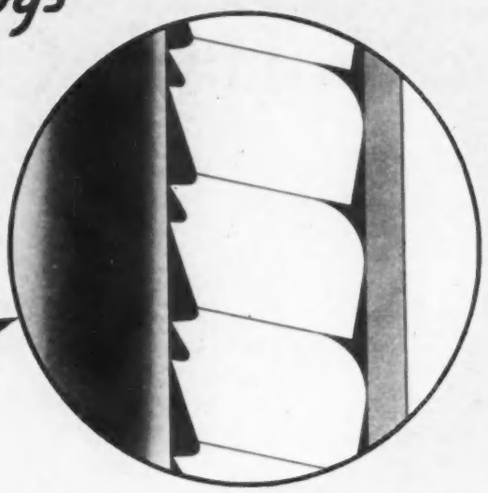
Published every Monday. Single Copies 15 cents (Special Issues 50c). Subscription price: domestic and foreign, $2.00 a year; 2 years $3.00. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879. Subscription restricted to those engaged in the producing and pipe line branches of the oil industry or the manufacturing and distribution of oil field supplies. Advertising rates on application.

Copyrighted 1941 by The Gulf Publishing Company.

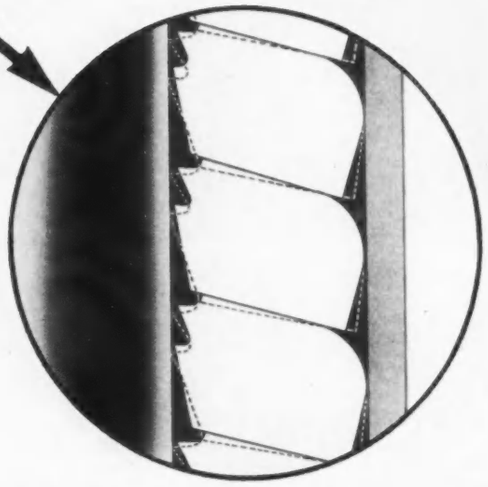
How Mission *"Rolling Dogs"*

RELEASE PIPE INSTANTLY





GRIPPING. **When pipe is being supported by slips, the small non-continuous dog teeth grip the pipe with minimum damage. The dogs are shown in supporting position.**



RELEASING. **When the load is taken off the slips, the dogs roll upward and away from the pipe as indicated—releasing the pipe and releasing the slips from the bowl.**

MISSION Slip dogs roll upward and away from the pipe as it is lifted—assuring instant release of the pipe and preventing slips from sticking in the bowl.

In addition to assuring instant release, Mission Slips help to speed up round trips in other ways. Light weight, perfect balance and well designed handles *save time* and *reduce operator fatigue.*

Pipe is Protected. Ample gripping area prevents bottlenecking and small, non-continuous teeth prevent undue stress concentration and corrosion fatigue.

Check Up! Make sure you have a set of Mission Slips for every pipe handling need. Mission Manufacturing Company, Houston, Texas, Export Office, 30 Rockefeller Plaza, New York.

For Faster Round Trips and Maximum protection to pipe—use—

MISSION

ROLLING DOG SLIPS

Mission "Rolling Dog" Slips
One Piece Type

THE OIL WEEKLY

MARCH 31, 1941

VOLUME 101 NUMBER 4

The Changing Panorama

In its forecast for April, the United States Bureau of Mines said total demand for all oils in the April-May-June quarter will be 5 percent greater in 1941 than in 1940. In the first quarter of 1941, there was an increase of about 3 percent over demand of the initial quarter of last year.

Gasoline currently is the star performer among the various products, the bureau having estimated that domestic demand in April would be 10 percent greater than in that month last year, while exports would be nearly as large. In the first three months of 1941, similarly, the markets have absorbed 10 percent more gasoline than in the like months of last year.

Texas Taxes Deterrent . . .

Texas producers will have to obtain a crude price raise averaging 3 cents a barrel or lose equivalent net revenue from the crude they produce under terms of the omnibus tax bill as passed by the Texas house of representatives.

The bill is designed to raise in the oil and gas industry the equivalent of about 6 cents a barrel on crude oil produced in the state, against corresponding tax of 3 cents now in effect for the items involved. (Specifically, it would raise about $30,000,000 annually, as compared with $15,000,000 a year under present laws, from production of crude oil, natural gas and condensates, and from gathering of gas, increased franchise taxes, and revision of motor fuel taxes to include distillate, butane, diesel oil, etc., to be paid by the user.)

While Texas producers currently pay only about 3 cents a barrel as gross production tax, they actually pay in all at present, to the state and political subdivisions of the state, over 9 cents a barrel in taxes. (In 1939 the total tax on an average barrel of crude oil produced in Texas was 9.23 cents, having included the gross production tax averaging 2.94 cents a barrel, a gross receipts tax of 0.14 cents, regulatory tax of 0.19, state ad valorem tax of 0.98 cents, franchise tax of 0.06 cents, other state taxes 0.62 cents, and local ad valorem taxes of 4.3 cents.)

Under the proposed new tax rates, the total tax on each barrel of crude oil produced in Texas would be increased, therefore, from about 9 to 12 cents a barrel, or 12 percent of the present $1 average posted price per barrel. Even without the proposed increase, the Texas taxes on crude oil are higher than those in any other state, being fractionally higher even than the steep taxes in Louisiana, which average 8¾ cents a barrel. (For details of taxes by states, see The Oil Weekly, March 3, 1941, page 44.) Raising of the total taxes in Texas to 12 cents a barrel would further reduce the attractiveness of the state as one in which to operate.

Texas showed an increase of only 3.5 percent in well completions in 1940, as compared with an increase of 10.9 percent for the nation; and in the first two months of 1941, Texas completions were down 10.9 percent, as against a decline of only 7.2 percent for the whole country.

High taxes on crude oil production have not been the only deterrent to oil development in Texas, but they certainly have been a retarding influence. Strangling the goose that lays the golden eggs threatens to impair the valuable fowl's health instead of increasing the output of eggs.

Wrong Name in Head . . .

German Bundsmen Halt Defense Work in United States. What a wave of indignation would follow publication of a story with a headline like that. If we read in our daily paper that German Bundsmen stopped workers at the gates of an American factory manufacturing defense products, hurled tear gas bombs at police guarding workers, over-turned cars, stole tires and batteries from workers' cars until the sheriff of the county appealed to the governor for help, all in an attempt to stop production until the management agreed with them on some matter of international policy, the country would promptly deal out to those Bundsmen what Teddy Roosevelt promised for fifth columnists back in World War I.

Does the story read any better when it is the CIO taking the place which Bundsmen do not dare occupy?

Gleanings . . .

If attainable at all, gasoline is selling for 95 cents a gallon in Rome • • • Skelly Oil's vice president H. M. Stalcup: "God help this industry (oil) if it ever has to operate under the jurisdiction of Harold L. Ickes" • • • Higher wages for approximately 50,000 employes of major companies in and near Houston will be asked within the next few months by Oil Workers International Union (CIO) • • • It was a whiskey warehouse set afire during recent bombing of Edinburgh, Scotland, and not, as Germany claimed, an oil refinery. There are no oil plants in Edinburgh • • • Lynn Converse, Tulsa: "Many water flood failures may be attributed to overlooking the viscosity of the oil in place, which influences its flow through porous media" • • • In six years 141 diesel-powered passenger trains have been put into operation in the United States. Now it appears a vast new market is being opened. Recent orders have been placed for giant diesel-electric freight locomotives, first indications this form of power will be used for heavy hauling • • •

New Skill Will Determine

By E. DeGOLYER

". . . . It is my opinion that there are enough undrilled but known prospects, and there is enough territory not yet fully examined by the seismograph to maintain current discovery rates for the next five years or so. Beyond that the discovery rate must depend upon the skill which we develop in searching for stratigraphic traps and upon our success with new techniques, such as the electrical methods or soil-gas surveys or upon either of them. We are probably somewhere near the end of our whole structure-finding type of prospecting."

Future of Oil Prospecting

PROPHECY is not particularly difficult so long as one confines himself to a dimensionless future. It is only when attempts to gear forecasts to immediate and definite years are made that the matter becomes difficult. The prophet may be right as to the nature of events to come but very wrong as to the time when they will come.

Of all the many phases of the oil business, discovery—oil finding—lends itself least satisfactorily to forecasting. The discovery of oil in terms of barrels is in a large degree independent of nature, type, size, or number of prospects drilled. When a pool equal to 10 percent of the total past production and proved reserves of the United States can be discovered by a single exploratory well of an illy financed independent operator, under the noses, so to speak, of the high-powered geological, geophysical, and land departments of an industry spending millions of dollars annually in its prospecting effort, we must admit that discovery, in barrels at least, is an independent variable.

Prospecting Secretive

Furthermore, because of its very nature, prospecting is the most secretive branch of the producing effort. One would have great difficulty in securing even moderately adequate information as to the number and nature of the discovered but undrilled prospects held in reserve by the industry. Indeed, it would be impossible to secure such information. Nor would such information be of great value in attempting to forecast discovery, even if it could be secured, unless comparable information for a number of previous years were made available.

The intensity of the prospecting effort of the industry varies with (a) the price of oil, (b) the general availability of unexplored areas in territory believed to be potentially oil bearing, and (c) with the availability of an adequate prospecting technique.

Since a change in the price of oil increases or diminishes the profit or loss of the industry, its effect on prospecting is obvious. In particular, it affects exploration by independents, and independents are the great wildcatters in our industry. A cursory review of discovery during the past three years shows that two thirds of the discoveries, in units of pools, are made by independents. The number of dry holes drilled, while by no means a perfect index, is probably the best index available to us of the extent of exploratory drilling. Pogue[1] has correlated the number of dry holes drilled annually with the weighted average price of crude oil for the 20-year period, 1915-1935, and shows this relationship very clearly.

Variations in Intensity

The increase in the prospecting effort with the opening of a new province such as that resulting from the discovery of oil in the Permian Basin of Texas and New Mexico, the discovery of new fields in the Illinois Basin, or the recognition of possibilities in the Forest City Basin, or the collapse in exploration following the completion of the refraction seismograph surveys of the Gulf Coast for salt domes, are excellent examples of the variation in intensity of effort with availability of areas in territory believed to be potentially important as oil territory.

Changing concepts of the conditions of oil occurrence are of prime importance in changing belief in whether or not territory is potentially important and the discovery of an important pool in a deeper sand may be the basis for renewed faith in an entire region and so restore it almost entirely to the potentially important available territory. The discovery of the Wilcox sand in Oklahoma, of the Eocene production in the San Joaquin Basin of California, and of the Lower Cretaceous production of Southern Arkansas, Northern Louisiana, and East Texas, are excellent examples of the basis for renewed prospecting in areas which had been prospected previously for shallower sands.

The discovery of a new technique which makes areas amenable to examination as to geological structure in advance of drilling which could not be so examined previous to the introduction of that technique is probably as important as any other single factor in promoting an increase in prospecting activity. The great impulse given to prospecting by the introduction of surface geological work as a guide in Oklahoma and Kansas about 1912-1913, and of core drilling for structure in the same states in the early twenties, by the introduction in the Gulf Coast of the refraction seismograph in 1924; and to prospecting in Oklahoma in 1930, Illinois in 1936, California in 1933, and in various other parts of the United States in recent years, by the successful introduction of the reflection seismograph, are excellent examples of the increase in exploratory activity as a result of the availability of a new technique.

Geological Speculation

One cannot make a serious study of the results obtained from the prospecting efforts of the industry in the past without being impressed with the fact that the chief contribution of the geologist has been in what, for lack of a better term, I will call geological speculation. Nor can he escape the importance in the past record of discovery of casual or unsophisticated drilling. I suppose that the commonly held idea of the work of the petroleum geologist as a prospector is that he goes into the field, searches until he finds definite evidence on the surface of a closed structure which he maps and recommends. This may have been true in the early days of geology in the industry but for the most part the geologist has had to deal with fragmentary evidence and his best

[1] Elements of the Petroleum Industry, 1940, p. 460.

work has been of a speculative nature.

The whole history of our theories of oil accumulation has been one of constant broadening in an attempt to find the common denominator. First it was the anticlinal theory, then the structural theory, and now the trap theory. It is unfortunate, perhaps, that oil pools were first studied by geologists rather than physicists or engineers. If the pool had been studied and described in its physical essentials, the geologist would have recognized that the physical essentials could be found under an almost infinite variety of geological conditions. The petroleum engineers of today are very much concerned with understanding the oil pool as a physical thing and geology is only a part of their problem. Their consideration is along the broadest possible lines. One eminent engineer states it thus, "Any porous earth formation underlying an impervious one is a potential oil reservoir." Perhaps, as geologists and prospectors, we can profit by starting with an equally broad definition. Any geological abnormality strongly suggests the possible occurrence of trap conditions.

Presumably, before many more years have passed, we will have exhausted, as a practical matter, the structure type of prospect. It is reasonably certain that the so-called stratigraphic type of prospect will have distinct characteristics from the standpoint of exploration. On averages, one well, properly located and drilled, is sufficient to exhaust 80 to 90 percent of the possibilities of oil discovery on a definite structure. It is not likely that the stratigraphic trap type of prospect can be explored so easily. Experience has taught us that three or four or even a half-dozen unsuccessful wells may be drilled before the actual value of the prospect is determined.

Obviously, this type of prospecting normally requires many wells. It is important therefore that the wells be drilled cheaply. I had thought that possibly the solution of this problem, in part at least, was in slim-hole drilling. This does not appear so certain at the moment. A decided step forward is the plan, adopted within the past few years by at least one major and several minor companies, of drilling to a predetermined depth without coring, then taking an electric log, and side-wall sampling any formation indicated by the electric log as showing possibilities of oil production. This procedure results in a substantial reduction of cost in the prospect well.

There are two types of prospecting which will last as long as the industry; by subsurface methods and by casual and random drilling. Subsurface studies depend upon slowly accruing data as wells continue to be drilled and upon interpretation, a form of geological speculation. Probably the chief importance of subsurface studies at the present time is in giving leads to be resolved by other techniques. One can hardly overemphasize the importance of casual and random drilling in the development of our reserves up to the present. It will be equally important in the future. Not only are important fields discovered from time to time by this method but contributions of critical value to our subsurface studies are made by it.

It is my opinion that there are enough undrilled but known prospects, and that there is enough territory not yet fully examined by the seismograph to maintain current discovery rates for the next five years or so. Beyond that, the discovery rate must depend upon the skill which we develop in searching for stratigraphic traps and upon our success with new techniques, such as the electrical methods or soil-gas surveys or upon either of them. We are probably somewhere near the end of our whole structure-finding type of prospecting.

Hats Off to the Progress of Oil-Prospecting Science

THE YEARS have witnessed steady and remarkable advancements in the art of oil prospecting. Recent years are noteworthy because of the vast broadening of the field. Progress in the various prospecting sciences are responsible for the discovery of such huge volumes of crude oil that a substantial future reserve supply has been created while meeting the most rapid consumption expansion ever known by any of the necessary commodities. Without such achievements, oil could not have prospered and grown into the third largest industry of the United States.

The industry and the world at large are deeply indebted to those who have contributed improvements to the art of petroleum prospecting, and they are saluted in this special issue of The OIL WEEKLY devoted especially to more recent advancements in this science.

It is particularly fitting that recognition should come at this time, on the occasion of the annual meetings of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists and the Society of Economic Paleontologists.

To a considerable degree, the meetings of these organizations will be devoted to a study of prospecting sciences and future possibilities. Particular significance is attached to a round-table discussion on "Possible Future Oil Provinces in the United States and Canada" that will be held Tuesday evening, April 1.

Other papers on prospecting progress to be read at sessions of one or the other of the groups include: The Future of Geophysics; Micropaleontology, Past and Future; The Role of Surface Geology in Petroleum Exploration; Trends in Petroleum Exploration; New Gravitational Method of Defining Underground Structure; Some Factors Affecting the Resolving Power of Electrical Logging Methods; Geochemical Well Logging; Radioactivity Analyses of Oil Well Samples; Radioactivity in Applied Geophysics; Use and Application of Radioactivity Logs; Prospecting Effectiveness; Effect of Acidizing Sand Reservoirs; Wildcat Drilling Success in 1940, and others.

National defense also will have a prominent place on the programs. Dr. Robert E. Wilson, president of Pan American Petroleum & Transport Company and head of the Petroleum Section Advisory Commission to the Council of National Defense, will discuss "Petroleum and the War." Dr. L. C. Snider, AAPG president, will speak on "Petroleum Geologists in the National Defense Program." J. Edgar Pew, vice president of Sun Oil Company, will discuss "The Fifth Dimension in the Oil Industry," and N. C. McGowen, president of United Gas Pipe Line Company, will discuss "Natural Gas with Regard to Its Place in National Defense."

Numerous other papers will be on more technical phases, and on developments in specific regions of the United States and foreign countries. Several field trips have been arranged, as well as entertainment features.

Drilling and Reserves

WHAT would be the effect if oil-well drilling were suddenly curtailed at federal government invitation to save steel and other supplies for other industries?

We do not believe that there is any likelihood of such action on the part of the government (a rumor that such a procedure was in consideration proved unfounded last week), although there has been considerable misinterpretation of various statements that the oil industry could increase its production for six months or more without additional drilling.

So far as we have known, no oil man nor anybody connected with the oil industry in any way, has ever even intimated that there should be a cessation of drilling operations. (The legal status of leases would make that impossible.)

However, it is interesting to speculate as to what would have happened in 1940 if oil-well drilling had been stopped on January 1 and kept shut down until December 31.

As a result of wildcat drilling in 1940, sufficient new oil reserves were found to take care of all of 1940 consumption and add 500,000,000 barrels to the reserve. This means that about 1,800,000,000 barrels of new oil was discovered as a result of 1940 drilling, and that if such drilling had not been done, the country would have wound up the year with a reduction of more than 1,300,000,000 barrels, instead of a gain of more than 500,000,000 barrels in its proven reserves!

The above figures are based on the report on 1940 additions to reserves, by the American Petroleum Institute, just released.

With the federal government greatly concerned about our reserves for future consumption, it would appear that any move toward unnecessary curtailment in drilling, either by the government or by oil companies themselves, would be ill advised.

How Would the Public Benefit?

WHILE the chance of federal oil control being made into law by Congressional action is regarded as small by Washington observers, there is a real fear that the oil industry will awake some morning and discover that by presidential decree, as an "emergency measure" federal control has been applied "for the duration."

This fear brings up some pertinent questions, questions of an extremely practical nature since it must be granted that even emergency measures must have improved public benefit as their reason for existence.

Just what would federal control do for the benefit of the public which cannot and is not being done under private direction?

Under federal control could the geological work of the oil companies produce better results?

Under federal control could the oil companies make better lease terms with land owners, and would that be advisable?

Under federal control could the oil companies drill wells any faster or more cheaply than they now can drill them?

Under federal control could the oil companies pump the wells faster, or get more oil from flowing wells than they can do under private direction?

Under federal control could the oil companies transport the oil any faster or better than they now do?

Under federal control could the oil companies do a better job of refining, of research, than the companies are now doing?

Under federal control could the companies get the refined products to market faster, provide better facilities for dispensing it to the public, or sell it for less than they are now doing?

Under federal control would there be a stimulus for greater efficiency than now exists?

The answer to these questions is a unanimous "No" and if the American public were asked these questions, their answer would be an emphatic "NO!"

EDITORIAL

THE OIL WEEKLY

MARCH 31, 1941

Vol. 101 No. 4

Stratigraphic Exploration *and* Future Discoveries

By DR. V. E. MONNETT,
Director, School of Geology,
University of Oklahoma

DR. V. E. MONNETT majored in geology at the University of Oklahoma, followed by graduate work in geology and soils at the University of Michigan and at Cornell University, receiving his Ph. D. from the latter in 1922. He has done field work in New Mexico, New York, South Dakota, Kansas and Oklahoma, and has published contributions in the fields of glacial geology, structural geology and petroleum geology. He was instructor in geology at Cornell University from 1913 to 1917, when he went to the University of Oklahoma as professor of geology. In 1925, he became director of the school of geology and director of the school of geological engineering at the University of Oklahoma—positions which he now holds.

SINCE the beginning of the petroleum industry in the United States, geologists and other men interested in oil have gradually picked up many new phrases which appear to express in a few words any ideas as to the occurrence or accumulation of oil. Many of these phrases had a definite meaning at the time they were adopted, but through misunderstanding or misuse, they soon came to refer to a polyglot of ideas incapable of being resolved into a single clear conception.

Almost any oil man today has a speaking knowledge of such things as "buried hills," "shoestring sands," "granite wash," and many others of like character. In the past few years the term "stratigraphic trap" has been added to this list, and oil company executives, geologists, land men, scouts, and production men have become more or less familiar with the phrase. We are being warned by certain governmental agencies on the one hand to decrease exploration and prevent waste. On the other hand, we are being advised by the petroleum geologists that oil "structures" are becoming so rare that in order to maintain production we must be on the search for stratigraphic traps.

There is general agreement

among petroleum geologists today on the following points:

1. That most of the favorable surface structures in known oil areas have already been tested.

2. That through geophysical instruments, core drilling, and other methods, many subsurface structures without surface expression have been discovered and tested.

3. That from 25 to 50 percent of the oil of the United States occurs in traps which do not come under the ordinary conception of structural traps.

4. That a large part of the future oil supply must, therefore, be obtained either from surface structures outside of present accepted oil areas or from subsurface structures not yet recognized, or from the type of accumulation which is at present termed a stratigraphic trap.

The Anticline Theory

As early as 1861 two geologists, E. B. Andrews and J. S. Hunt, had recognized the tendency of oil and gas to be associated with anticlines and to occur in the order of their density. When I. C. White in 1885 proposed his theory of gravitational separation, which later came to be called "the anticline theory," it was generally accepted as fact that gas and oil were commonly found in the higher portions of anticlinal or domal folds. This conception has had more influence on exploration for oil and gas than all other factors combined. It should be kept in mind that the oil and gas sands of the Appalachian field are almost exclusively actual sandstones, which are fairly continuous in extent and reasonably homogeneous in character. This is in marked contrast to many of the producing horizons of the Mid-Continent and Gulf Coast areas. When the limestone production of Ohio and Indiana was discovered in 1884 and, notably, when the Clinton gas area of Central Ohio was brought in, it was noticeably apparent that other factors besides folding of the rocks were governing the accumulation of oil and gas. The knowledge of the importance of stratigraphic traps, therefore, preceded the discovery of the East Texas District by about 50 years. When the active development of Kansas, Oklahoma, and Texas oil pools took place in the period 1910-1940, the importance of unconformities, which marked the old erosion surfaces, together with the sand lenses and other shoreline features, became more and more apparent. This was recognized by a number of prominent geologists, including W. V. Howard, A. W. McCoy and others.

Types of Stratigraphic Traps

In A. I. Levorsen's presidential address to the American Association of Petroleum Geologists in 1936[1] the term "stratigraphic trap" was defined as follows: "One in which a variation in the stratigraphy is the chief confining element in the reservoir which traps the oil." This definition would apparently include any accumulation not directly related to folded or faulted strata, but there is considerable question in the minds of many geologists as to exactly what types of unconformities should be included. Folded strata are undoubtedly present in most unconformities. If we restrict the term "stratigraphic trap" to those accumulations in which folding and faulting apparently play no important part, we still have left the following types:

1. Sand lenses in a mass of shale.

2. Permeable zones in sandstone surrounded by less permeable material of similar lithologic character through differential cementation.

3. Solution zones in calcareous rocks.

4. Porous zones terminating against unconformities.

5. Pockets of permeable material on a surface of unconformity.

6. Porous sands terminated by intrusions of salt or igneous material.

The first type mentioned is probably best illustrated by the shoestring sands of Greenwood and Butler counties, Kansas, or of similar shoestring sand conditions of Maikop, Russia. (See Figure 1.) This type is not limited to long narrow sand bodies as it includes any rounded, sheet-shaped, or irregular mass of coarser material completely surrounded by finer material. The Gatchell pool of California, as well as numerous pools of Illinois and the Mid-Continent area, are perfect illustrations of this true lense occurrence. The mode of origin of such lenticular masses undoubtedly has much to do with their likelihood of serving as oil traps. It is generally believed that most of them are found in close association with ancient shore lines where optimum conditions should exist.

The second type, as shown in Figure 2, is well illustrated by any of those pools characterized by "tight" spots in the producing sandstone horizon. Probably the basal Pennsylvanian sands of northeastern Oklahoma, such as the Burbank, Bartlesville, and Glenn, will serve as good illustrations. The controlling factor in limiting production in such pools is the decreased permeability which apparently has resulted from more thorough cementation. In many cases it appears that the zones of less cementation occur in the portions of the pool which are lower structurally. Some of the so-called synclinal production has proved to be of this type.

Big Initial From Limestone

The wells having the largest initial production of any ever drilled have without exception been those producing from calcareous rocks, such as limestone, which has unusual permeability because of partial solution as shown in Figure 3. The unbelievably large wells of the Tampico area of Mexico, the first Spindletop gusher, and the Yates, Texas, wells belong in this category. Such limestones probably either have been exposed actually at the surface, or at least near enough to the surface to be in the zone of active circulation of underground water. This type of stratigraphic trap is therefore determined by two factors, the presence of limestone and the existence of an unconformity to indicate that the necessary conditions for solution of the limestone were present.

When a permeable rock such as sandstone terminates against an impervious rock, as the Woodbine sand of East Texas or the Simpson sands of the Oklahoma City pool do, the actual trap is probably best attributed to the unconformity. The sands may be laid down adjacent to an old land mass as in Figure 4, or they may have been uplifted, folded and eroded before the terminating beds were deposited as in Figure 5. In either case the contact between the sandstone and the impervious shale will be the trap causing accumulation.

When the first oil wells of the Panhandle of Texas were drilled the term "granite wash" was introduced to apply to the porous material resting in pockets of irregular size and shape on the old

[1] A. I. Levorsen, "Stratigraphic versus Structural Accumulation," Bulletin, American Association of Petroleum Geologists, Vol. 20, No. 5, May, 1936, page 524.

weathered granite surface. Such basal conglomerates or sands are well illustrated in the Gorham pool of Kansas. The "chat" horizon of Kansas and the Misener sand of Oklahoma and Kansas are examples of such deposits which rest on the weathered and eroded surface of many old buried hills and valleys that are found below unconformities. (See Figure 6.) Such deposits occasionally interfinger with the sediments deposited on such old land areas, and therefore may have some of the characteristics of the type illustrated in Figure 4.

The type of trap shown in Figure 7 is rare. The piercement type of salt domes afford numerous examples of oil traps in porous sands terminating against a plug of rock salt. Likewise some of the oil traps of Northern Tampico, Mexico, are formed by old volcanic plugs sealing off porous rocks. In both of these cases, however, the rocks dip away in all directions from the plug instead of having one direction of dip. Whether such traps should be called structural traps or whether they are true stratigraphic traps depends upon individual interpretation.

Technique of Prospecting

Prospecting for each of the separate types of traps mentioned above involves a technique which differs from the ordinary methods employed in attempting to locate purely structural traps. The task is infinitely more complex and involved than the comparatively simple methods employed in locating the domes and anticlines. It may not be quite as difficult as implied by the statement of Ross L. Heaton,[2] who said: "The searcher for oil pools of the stratigraphic type must keep himself informed concerning everything that had been done with respect to research on the origin of oil, the nature and manner of occurrence of source beds, studies of modern sediments, causes and processes of change from the original organic material to petroleum, movement from source beds to reservoir rocks, and, finally, migration and accumulation." Nevertheless, it undoubtedly is true that the stratigraphic traps of the first, second, and third types will be most difficult to locate, unless some type of geophysical instrument is evolved which will give information of a different type from that supplied by those in use at the present time.

Most geologists are emphasizing the necessity of drilling test wells for the purpose of procuring important information on stratigraphy and sedimentation. Such wells would be located after a thorough study of all surface information and available subsurface information, and would be drilled with little or no thought of commercial production. Such wells do not necessarily need to be deep tests, but should be located so as to give the maximum information regarding such factors as thinning of the geologic section, appearance or disappearance of porous zones, and presence of unconformities. The "slim-hole" and core-drill exploration being carried on by many of the major companies is an important step in this direction, but will need to be accompanied by occasional wells of greater depth in order to supply more authoritative information.

Any prospecting for stratigraphic traps necessarily must involve very detailed and careful study of the well samples themselves from all available wells in the area, as well as from rock outcrops in adjacent uplifts. Detailed measurements of sections and observation of all variations in lithology must be made. This information should then be supplemented by water analyses and all other available subsurface information, such as electrical logs, radio-active logs, geochemical logs, etc.

Structural Uplifts

One of the most striking facts concerning the location of the known stratigraphic traps is that practically all are definitely associated with some regional structural uplift. The Cincinnati Uplift, the Sabine Uplift, the Nemaha Uplift, all play an important role in localizing various types of stratigraphic traps. The reason for this is immediately apparent to the person who recognizes the close association of the conditions forming stratigraphic traps with those environmental factors which exist on the flanks and the crests of those areas which have alternately been above and then below sea-level. The shore-line features which probably gave rise to such features as shoestring sands, pockets of granite wash, or other basal conglomeratic sands such as the Misener sand, definitely are associated with regional uplifts. Likewise those limestones in which solution cavities are best developed appear to be most common on buried ridges or broad folds which are structural in origin.

According to Carl C. Addison,[3] "There is some evidence that greater porosity or at least a higher degree of permeability exists on top of the structure than on the flanks and that the presence of permeable rocks here is in some way related to structural uplift. This possibility is suggested by the fact that wells on structure show good porosity while some wells only a short distance from production, but structurally low, show no oil or gas, and but little water in the producing zones."

The porous zones tend to pinch out on the flanks of the structure.[4]

This condition has been noted in so many pools that perhaps we should stop and ask ourselves if after all, many of the so-called structural traps are not in reality stratigraphic traps. Indeed it may appear that determination of structure is one of our best criteria for the location of stratigraphic traps.

Nor is this association confined to the larger structural features. In the east side Coalinga (Gatchell) pool, according to F. A. Menken, "Stratigraphic accumulation include the east side Coalinga (Gatchell) pool and the Northeast Coalinga area."[5] The structure is a southeast plunging anticline without structural closure and the productive Eocene sand of 600 feet thickness lenses out or becomes siltstone up dip.

Sand lenses of such thickness if occurring in thick masses of shale normally would be expected to cause structural noses or even anticlines of small closure in the overlying beds. Whether such folds are due to differential consolidation or to the buttress effect of the thick sand is not important so long as the presence of a lense is indicated by the structural attitude of the overlying rocks. John L. Rich[6] points out that in the shoestring sand lenses of southeastern Kansas

[2] Stratigraphy versus Structure in the Rocky Mountain region, American Association of Petroleum Geologists, Vol. 21, No. 10, October, 1937, page 1243.

[3] Buckeye Oil Field, Gladwin County, Michigan. American Association of Petroleum Geologists. Bulletin, Vol. 24, No. 11, November, 1940, page 1975.

[4] Refer to the figure on page 1974 of the above publication.

[5] American Association of Petroleum Geologists, Vol. 24, No. 11, November, 1940, page 1948.

[6] Shoestring sands of Eastern Kansas, American Association of Petroleum Geologists, Vol. 7, No. 2, page 108.

Types of STRATIGRAPHIC TRAPS

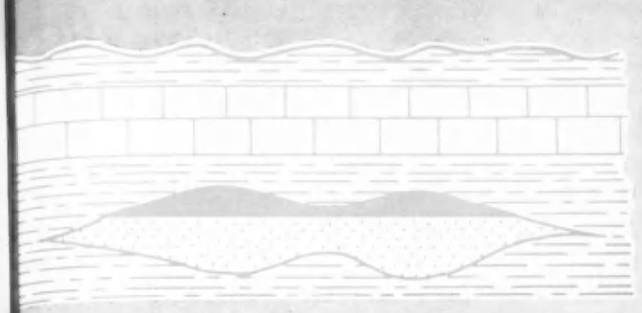


FIGURE 1
Sand lenses in a mass of shale

FIGURE 2
Permeable zones in sandstone surrounded by less permeable material of similar character through differential cementation

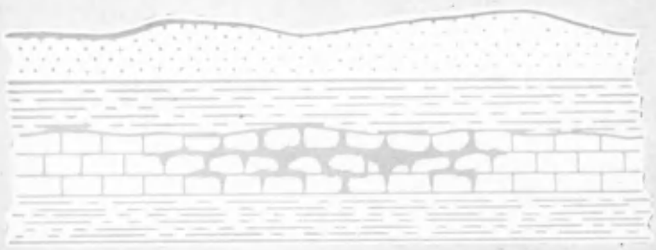


FIGURE 3
Solution zones in calcareous rocks

FIGURE 4
Porous zones terminating against unconformities, in this case laid down adjacent to an old land mass

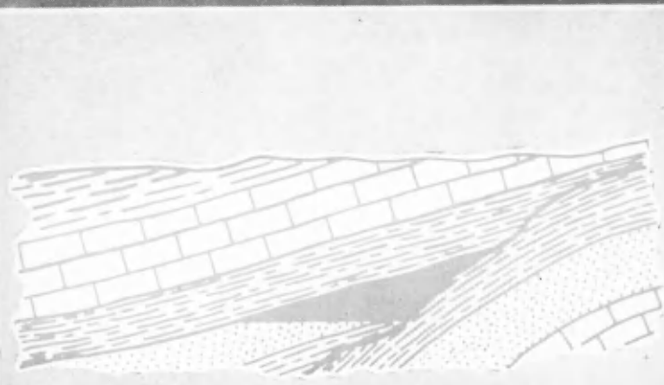


FIGURE 5
Sands uplifted, folded and eroded before the terminating beds were deposited

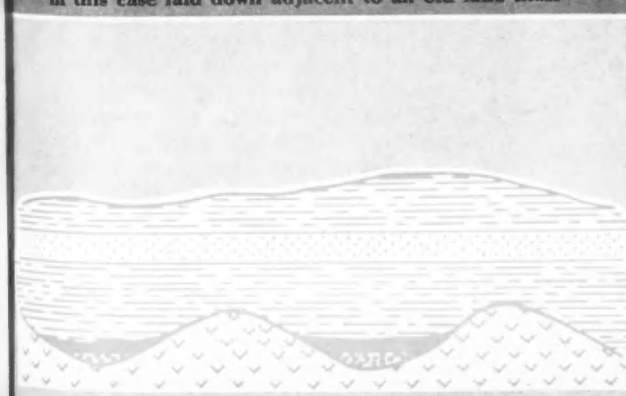


FIGURE 6
Pockets of permeable material on a surface of unconformity

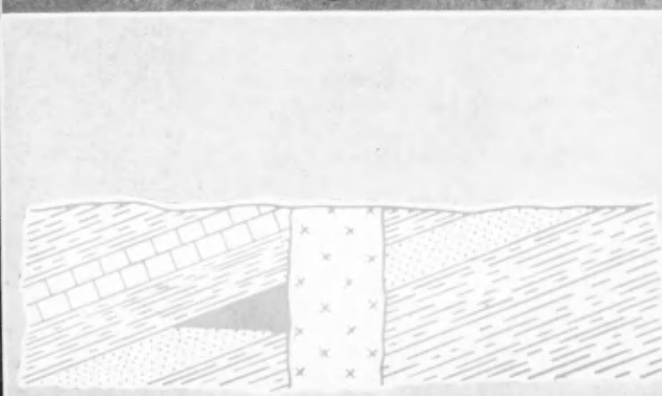


FIGURE 7
Porous sands terminated by intrusions of salt or igneous material

production is closely related to structure.

There are so many factors which give such expression to the structure of the overlying rocks that this criterion alone should only serve to focus attention on such an area.

Specifically the methods to be employed in attempting to locate stratigraphic traps may be listed as follows:

1. Continuous search for structural features such as regional arches and troughs or local anticlines, domes, or noses which may have localized stratigraphic traps or may reflect the conditions under which such traps occur.

2. Construction of geologic cross-sections from the information obtained by the study of well samples, electrical logs, and all other surface and subsurface information.

3. Construction of paleogeographic maps showing the probable location of ancient shore lines and all other possible land and water relationships which might effect sedimentation.

4. Construction of paleogeological maps showing the areal distribution of geologic formations at all known surfaces of unconformity.

5. Drilling of stratigraphic wells at points where detailed subsurface information would be of greatest value but where it is not now available.

6. The use of any geophysical or geochemical method of exploration which offers any promise of locating oil or gas itself.

The first of these methods recognizes the relationships proved to eixst between regional uplifts and unconformities and also the indicated connection between porosity and structure. If it is true that the siliceous lime of Central Kansas produces only on such ancient uplifted and eroded areas as the Barton Arch, the Nemaha Arch, and on "buried hills" in Oklahoma, then the subsurface distribution of such features should be carefully plotted.

In a recent article by F. J. Gardner[1] he stressed the importance of old erosion surfaces. If Gardner's statement that, "we must classify approximately 90 percent of the producing fields in Texas as unconformity fields" is true, then the structural features responsible for such unconformities must be first located and mapped in order to locate similar traps in the future.

Geologic cross - sections have been made of nearly every producing pool as soon as sufficient data had been obtained by drilling. The type of cross-sections needed for exploration purposes are those which will tie in the detailed information of the producing areas with each other by using the data from available electrical logs and similar data. In this manner the wedging of sediments can be recognized and the variation in lithologic character noted. Evidence of unconformities also will be detected and the relation of porosity to rock position may be recognized.

Paleographic maps usually are too generalized to be of much real value in locating possible oil traps. Such maps, which show the distribution of land and water for any particular unit of geologic time, have in the past of necessity been drawn largely on very incomplete and inaccurate data. If sufficient reliable information can be gained by detailed studies of sedimentary sections at the surface and from subsurface material, such maps would be most useful in helping to circumscribe the areas of the greatest promise.

Paleogeologic maps have been used very extensively to show the subsurface areas from which some sedimentary formations had been removed during a former geologic period. The pre-Mississippian map of Kansas undoubtedly has played an important role in helping oil companies to outline their exploration work in that state. Obviously, Hunton or Viola production cannot be obtained from an area where these formations were removed by erosion before the overlying sediments were deposited. Conversely it should be just as apparent that such an erosion surface would be just the place where older formations may serve as important oil-bearing rocks. Particularly would this be true if these older weathered rocks were limestones or other readily soluble rocks.

Core Drilling

Core drilling or "slim-hole" drilling has proved a very profitable method of discovering structural traps in areas where surface geology is too obscure to be determined. These portable drilling outfits have not only reduced the expense of drilling, but have been able to reach depths great enough to supply much valuable stratigraphic as well as structural information. Even the cost of much deeper wells drilled solely for geologic information probably would be justified if the costs were compared with the large sums that have been spent in geophysical and other types of exploration work. Besides there is always the possibility that such a "stratigraphic well" may turn out to be an oil well. Certainly enough of those drilled for oil have proved important only for the geologic information they supplied.

Many geophysical and geochemical instruments have been devised which will determine minute differences in rock density and composition. Others determine very minute differences in the hydro-carbon content of surface soils. Unfortunately the very slight differences in rock character at 2000 feet to 15,000 feet in depth which may permit oil to be present can not be measured by any known instrument. Many methods of approach to the problem of trying to locate oil itself, without the use of the drill, are being made. The soil analyses methods now being extensively tried are still indirect methods, since only certain hydrocarbons actually in the soil are determined. The source of such material remains a matter of inference. The various electrical-conductivity methods are all confronted with the problem of interpreting the heterogeneity of the outer part of the earth. In short, the physical and chemical characteristics of a 30-foot oil sand 5000 feet below the surface are so little different from a water sand in the same position that the variation of the upper 5000 feet of section probably will continue effectively to hide these facts.

Undoubtedly many of the stratigraphic traps of the future, as in the past, probably will be discovered largely through extensive wildcatting, in which the major companies will adopt many of the policies of the small independents. The detailed research carried on by a few of the scientific-minded individuals and companies fortunately will provide the sound back-log which will furnish the needed support to the more spectacular, but less permanent and valuable kindling, which also has its role in the fire of the oil industry.

[1] Relationship of Unconformities to Oil and Gas Accumulation, American Association of Petroleum Geologists, Vol. 24, No. 11, November, 1940, page 2023.

Technical Evolution of Petroleum Geology

By O. L. BRACE
Consulting Geologist, Houston, Texas

THE early geologist, through a study of surface stratigraphy, developed the basic data of locating oil accumulations. His original contribution, based on the anticlinal theory and regional metamorphism measured by the carbon ratio of underlying coal beds, was limited in scope. With few wells and little sub-surface information to be guided by, the search for oil was confined to areas of rugged relief and marked folding where numerous outcrops permitted the mapping of the anticlinal folds.

As the geographic limits of oil activity spread, the rather simple problem of the pioneer geologist became more complex. The anticlinal theory often fell short of explaining the relationship between structures and commercial pools. Whereas the idealized anticline is a relatively rare phenomenon, numerous diversified structural forms such as domes, terraces, lenses, stratigraphic pinch-outs and faults are widely distributed in nature and are all to be regarded as potential oil traps. Just as the simple type of structure that was sought under the anticlinal theory has multiplied to a dozen or more complex types, so the few horizons in the Paleozoics that were regarded as potential sources of oil have expanded to include zones occurring throughout most of the geologic column.

The intensified demand for gasoline following the introduction of mass methods of automobile manufacture and the increase in drilling depths of wells through improved drilling technique, widened the search for new petroleum reserves. The geologist kept pace with this demand and covered all corners of the world where outcrops were available and the formations were considered favorable for oil accumulation. With the broadening knowledge of the subsurface, new fields of inquiry developed which gave rise to petroleum geology as a separate branch of geological science.

O. L. BRACE **attended the University of Chicago and the University of Nebraska, receiving his B. S. degree from the latter just prior to World War I. Most of his geological experience has been in the Mid-Continent region, with short periods in California, the Rocky Mountain area, Mexico and Greece. He has had a consulting office in Houston since 1931.**

The petroleum geologist of today is still intimately concerned with structural problems but he also has to consider problems dealing with the character, distribution and trend of the multiple zones that are the potential source of oil, the intimate stratigraphic structure of the porous phases of these zones, and the physical characteristics of their fluid contents. Furthermore, he is interested in the interrelation of those factors which bear on the location of wells, the preservation of reservoir energy and the proper migration of oil which assures a most economical ultimate recovery.

Regional Concept From Well Data

Much of the reasoning of the petroleum geologist is by analogy so that the soundness of his deductions increases in direct proportion to the quantity and accuracy of the data with which he has to work. In many of the areas that are being subjected to oil exploration, much of the knowledge of sedimentation and stratigraphy is derived from scattered well records, each of which furnishes a highly localized picture of the geologic section. The projection of these data from well to well eventually results in a composite picture of the stratigraphy of the region as a whole. Obviously, the more detailed the individual well data and the more closely space the wells, the more intelligible becomes the regional concept. In regions such as the Gulf Coast, this detailed picture furnishes a conception not only of the distribution and character of the major geologic groups, but of the details of lateral lithologic gradation within specific members. Sands are best developed along certain zones that parallel the coast

and the relationship to such zones is of importance in appraising the potentiality of any given area. Within individual zones, sands become finer in their down-dip facies, with much of the original pore space filled with colloidal matter. Such changes are brought to light in the evidence furnished by the drilling of wells.

The instability of the depositional environment that characterized the geologic history of the Gulf Coast has created a stratigraphy that is extremely complex as compared to regions where conditions resulted in the laying down of individual beds in which uniformity of lithology and thicknesses are maintained over broad areas. Despite the greater uniformity in the character and distribution of rocks in regions inland from the Coast, the geologist is confronted by other problems that call for as great a degree of resourcefulness to effect a solution.

Newer Technical Processes

The thoroughness with which the exploratory activity of the oil industry was conducted prior to the beginning of the 1930's had resulted in the isolation and development of a majority of the favorable structures that it had been possible to identify by utilizing all available surface and sub-surface data. The constantly increasing demand for petroleum, therefore, forced the industry to encourage all research projects designed to produce technical processes and equipment that would facilitate the search for new oil reserves or would assist in a more acurate appraisal of many of the factors that are vital to geological investigation. Geophysics, one of the processes resulting from this research, thus became for the geologist one of the main sources of new structural information, particularly in areas where ordinary sources of such data had ceased to be productive.

The Gulf Coast has been the natural proving ground for new technical processes. The young, unconsolidated sediments of this region have constituted a major problem to the geologist and the necessity first arose here for a more thorough knowledge of the details of sub-surface stratigraphy than could be furnished by well logs or by paleontologic and mineral grain analysis of drill cuttings and cores. To fill this need, the electric well log was perfected and this recording device has proven an invaluable source of information regarding the geologic section under exploration by the drill. Combined with paleontology, the electric log now conveys a picture of stratigraphic sequence that is vastly superior to anything available in the past. The distribution of sands and the lateral changes in facies within recognized zones, are logged in a manner that is convertible to information of great value in appraising local and regional structural and stratigraphic conditions, as well as in gauging the potentiality of sands within or adjacent to proven areas. An additional technical service is designed to analyze cores through a study of porosity, permeability, reservoir fluids and pressures. This service represents a forward step in the geological problem of appraising the potentiality of the reservoir rocks themselves, and it has done much toward eliminating many of the uncertainties that attend the testing and completion of wells.

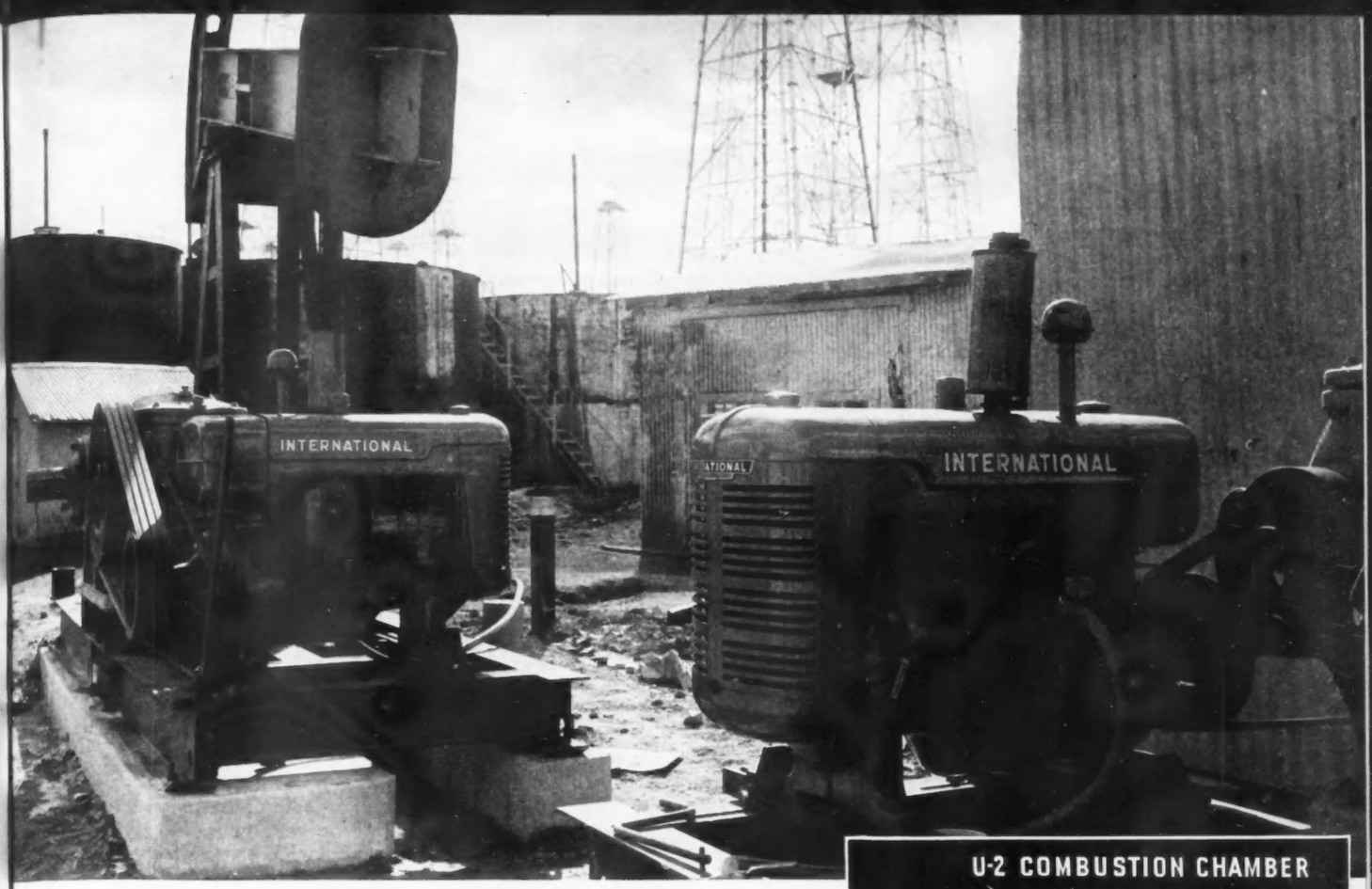
Supplement Older Methods

It is significant to note that none of these new mechanical methods of resolving technical data has forced the discard of the old methods from which they had their natural growth. They have tended rather to supplement and add to the information that results from the earlier, less exact methods. Surface outcrops and sub-surface drilling data are still the most acceptable structural criteria in areas where they are available in desirable quantities, although it is now the practice to check most significant areas with geophysics in an effort to add greater detail to the final picture of structural conditions. In like manner, the electric log serves as a natural complement to normal drilling information. This mechanical record is not designed nor is it qualified to replace paleontologic or core analysis data, but it supplies the stratigraphic detail that is so essential to an intelligent geologic analysis.

The various new technological devices and services that have been of such aid in clarifying the problems of the geologist, have had one important characteristic in common. As each was perfected, it was offered to the industry as something in the nature of a cure-all for the particular problems with which it was intended to cope and this appraisal was frequently accepted by the industry at face value. The tendency toward over-optimism on the part of the proponents of these services is partially to be explained by the fact that each has begun as a commercial venture that has had to bid for the favors of the oil operator and, in an effort to establish a short-cut to results that had previously been realized only by means of rather laborious processes, they failed to recognize the geological background to which much of the critical data were tied. Time, however, has brought about a clearer valuation of these services and coordinated them to produce the results for which they are best designed.

Geophysics and Geology

Geophysics was developed on the Gulf Coast, where large areas are entirely devoid of acceptable structural criteria, and the adaption of this technique has been phenomenally successful in isolating structures representing vast new oil reserves. The success of these methods of structural prospecting, particularly the reflection seismograph, encouraged the belief that theirs was a completely integrated service, requiring no knowledge of the geological background in order to operate successfully. Although the data that result from seismic field operation are structural factors that differ in no important sense from the surface dip or from dips established by the correlation of well records, there was a tendency to believe that the interpretation and correlation of such data should fall within the province of the geophysicist and not the geologist. This attitude was responsible for many of the difficulties that have beset the geophysicist, particularly when dealing with structures of low relief or those in which folding is complicated by faulting. During the initial phase of coastal operation, the seismologist was fortunate in having to deal with numerous outstanding structures, where major uplift involving large areas, made the details of structural occurrence a matter of secondary importance. His most important function was the recognition of areas of disturbance, after which the location of the discovery test was a relatively simple problem. The analysis of geophysical data that have been produced over low relief, faulted areas, is a much more complex one. In these cases, the relationship between minor folds and faults is a problem that depends largely on a



Two dependable, hard-working International U-2 Power Units on the job for Pace Oil Co., Kilgore, Texas

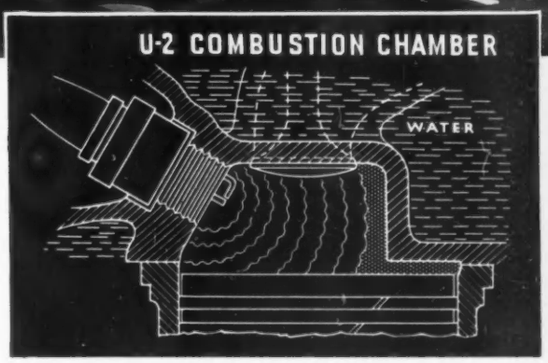
Hard-Boiled About Engines? Choose INTERNATIONALS!

If you're hard-boiled about engine operation, International Power Units are your logical choice.

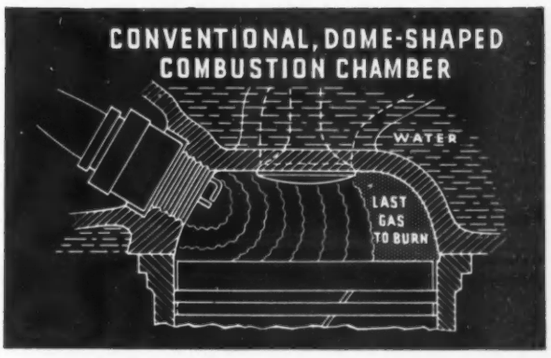
You have a wide selection of sizes and types (up to 110 h. p.) in the International Power Unit line. There are 4 and 6-cylinder models for gasoline, natural gas, distillate and Diesel fuel. Every one is designed to give you maximum fuel economy, smooth operation, and long life. In every one you get replaceable cylinder sleeves; Tocco-hardened crankshafts; dust-tight, water-tight magnetos and governors; thermostatically-controlled cooling system; and many other features.

Keep on the profit side with International Power Units. Ask the nearest International Industrial Power dealer or Company-owned branch to point out their advantages.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois



The combustion chamber in International Power Unit engines (above) is shaped so all parts are *close to cooling water*. There is less wall (cooling) surface area in proportion to the volume of gas than the conventional dome-shaped chamber has (below). There is *less heat loss*, more heat converted into power.



In this type of combustion chamber, the large volume of last gas to burn frequently ignites all at once, due to heat of excessively high *pressure* caused by expansion of ignited gas in rest of chamber. This wastes fuel, causes engine "knocking," valve and piston ring sticking, crankcase dilution, smoky exhaust.

INTERNATIONAL Industrial Power

type of reasoning that can only result from a broad knowledge of structural occurrence. It is true that many of these abnormal areas cannot be appraised in advance of the drill, but since it is known that structural types tend to repeat themselves, it is often that an uplift on a given trend may be classified as to type in the early stages of development.

It is now recognized that it is the chief function of geophysics to point out the actual presence of structural anomolies. When dealing with domes of major proportions on the Gulf Coast, it is frequently possible for the reflection seismograph to outline, with reasonable accuracy, the area affected by movement. In most instances, however, it is not to be anticipated that an interpretation of seismic data will produce a picture of the details of folding. Such critical details are only to be anticipated from a geological interpretation of well data as drilling progresses. In hard rock areas, it is frequently true that presistent indurated members that are recognizable as reflectors over broad areas, make it possible to convert seismic data directly into rather detailed structural pictures. Even here, however, close geological supervision is necessary in order to produce a valid result.

Importance of Electric Logs

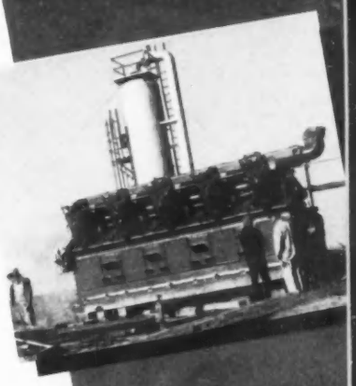
The failure to recognize the limitations of geophysics that characterized the early period of operation, also applied to the electric log during its introductory phases. This latter instrument is designed to furnish a stratigraphic log, a result accomplished by differentiating between sands, shales and limestones by means of their relative reaction to the passage of an electric current. It is an additional function of the electric log that it makes a record which may be interpreted, when supported by corroborative evidence, in terms of the fluid content of the logged strata. The individual record has a limited value and it is only when used in conjunction with other similar records that its geological importance develops. From the standpoint of the geologist, the electric log reaches its greatest effectiveness when recorded in a hole that has been cored at the critical levels. It is only then that the various curves may be given their true valuation by comparison with data furnished by paleontology and by core analysis. The self potential or porosity curve records the relationship of strata in the buried section in a more or less exact manner. The resistivity curves, however, while theoretically furnishing a record that is recognizably distinct for fresh water, salt water, oil or gas, are less exact and such differentiation may only be accepted when supported by core data. The above statement applies particularly to records of wells drilled in wildcat territory where the lithology and fluid content of strata are not definitely known. In producing areas, where the detailed characteristics of the section are more thoroughly understood, the geologist may frequently be justified in regarding resistivity curves as exact records.

Although the electric log makes a record of the geologic section that covers an area with a very limited radius, these records, when combined with others that are reasonably well spaced throughout an area, permit a surprisingly detailed conception of local and regional stratigraphic conditions. They are of particular value to the geologist in the construction of cross-sections, resulting in a comprehensive picture of the depositional history of a region. Because of the accuracy of the record of contacts between strata, the electric log furnishes supportive evidence to the paleontologic correlation data that is the basis for both regional and local structural interpretation. Since the electric log is not run until the drilling of the hole is completed, paleontologic picks derived from the examination of cores and cuttings permit advance estimates as to local structural position and most geologists base their structural contours on datum horizons established by fossil distribution. It is a fact, however, that there is some vertical migration to the limits of fossil zones in their relation to the sand strata in which oil accumulation occurs, and the electric log affords a definite check against an error in this direction. Within producing areas where sand gradations are a factor in oil accumulation, the electric log permits an exact appraisal of structural conditions that cannot be accomplished by other means.

It is logical that there should develop a tendency toward a too literal interpretation of the data recorded by the electric log. One manner in which this instrument excels is in denoting the presence of depositional gaps which might be indicative of faulting. When the relationship between sand and shale zones is exactly understood, fault data secured by this means is positive and may be accepted with few reservations. In dealing with the records of young beds such as the Miocene, however, there are cases where lateral lithologic gradation has been interpreted as an evidence of missing section, resulting in many domal uplifts being credited with an amount of low-displacement faulting that does not exist. A clearer conception of these hazards has lead to a gradual elimination of such errors in interpretation.

In some instances, the geologist himself has been at fault in accepting the new technical devices without a proper appraisal of their limitations. He has given consideration to the possibility that certain vital geological data may eventually all be resolved directly by instruments, without the necessity of geological analysis. This applies primarily to the problem of translating geophysical data into structural terms and in a secondary manner, to the reduction of the various stratigraphic data furnished by the electric log. This attitude on the part of the occasional geologist has resulted in much costly experimentation that might have been avoided. The logical attitude, and the one that characterizes the majority of the men in the profession, incorporates a recognition of the constantly growing necessity for a more thorough geological supervision of all exploratory and development activities. The special measuring devices designed to study the structural characteristics of rocks not exposed at the surface, which is geophysics in the restricted sense, and other devices that record the physical properties of rocks being penetrated by the drill, are recognized by the geologist as invaluable in increasing the amount of material made available in the search for new oil fields and for his evaluation of those fields in the process of drilling. These, combined with his knowledge of the general principles of sedimentation and of regional structural conditions, make for a working combination that should perpetuate the success of the geologist in the oil industry.

1,000 Horsepower Goes "on Location"!

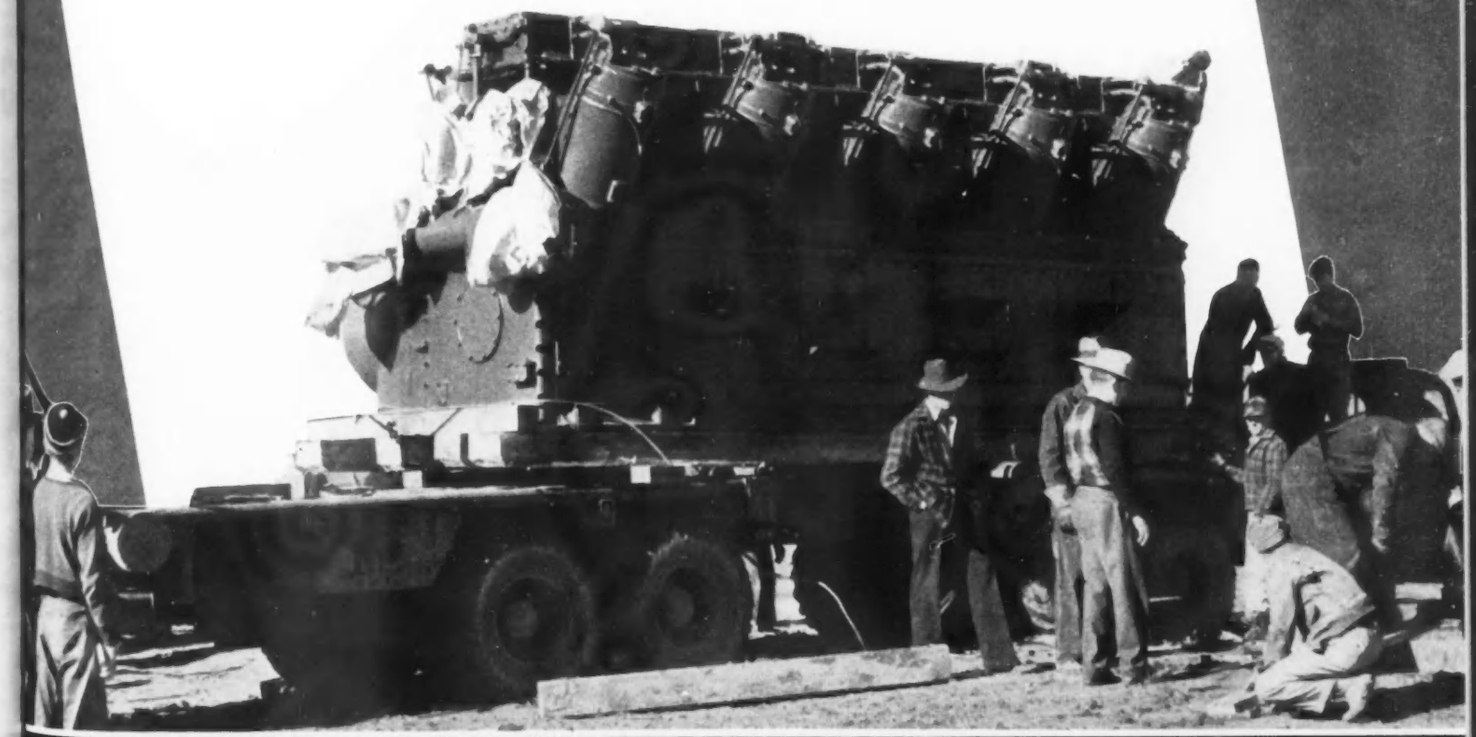


Here's graphic proof of the transportability of Type G-MV Compressors . . . a ten-cylinder unit, packing 1,000 rugged horsepower, being trucked to location . . . and what's more, completely assembled except for attaching compressor cylinders and flywheel!

This compactness means more than just easy transportation . . . it means that Type G-MV's will cut housing and foundation costs from 25 to 50 percent under other types of compressors! It also means that Type G-MV's can be installed and "on the line" in less time!

There are more reasons for the many Type G-MV's now serving the petroleum industry . . . Bulletin 332 will give you details . . . Write for it!

A ten-cylinder Type G-MV gas-engine-driven compressor "on location" for Cities Service Gas Company. This 1,000-hp unit is now moving gas from Pampa fields to Kansas markets.



THE COOPER-BESSEMER CORPORATION

Mount Vernon, Ohio — PLANTS — Grove City, Pennsylvania

) West 43rd St., New York City
estment Bldg., Washington, D. C.
640 E. 61st St., Los Angeles, Calif.
201 East 1st St., Tulsa, Okla.
631 Spring St., Shreveport, La.
Box 1856, Pampa, Texas
Box 454, Greggton, Texas
1501 Arcade Building, St. Louis, Missouri
Magnolia Bldg., Dallas, Texas
529 M & M Building, Houston, Texas

★

ANNOUNCING

The Appointment of

Mr. John H. Wilson

to Supervise Interpretation of all Gravity Data

★

IX Gravity interpretation is all done under the personal supervision of Mr. John H. Wilson, a geologist and geophysicist with 15 years of experience in gravity work.

Surveys are made with the New Electric IX Gravity Meter, developed by the Kannenstine Laboratories. This meter uses a stiff, rugged quartz spring supporting a comparatively small mass. High sensitivity is obtained by the use of stable electric circuits, rather than by delicate mechanical magnifying systems.

The accuracy of the New Electric IX Gravity Meter, under field conditions, is more than adequate for all present needs.

Gravity Crews are available for work throughout the United States and in foreign fields. Your inquiry is invited.

SEND for Bulletin "G" which gives further Details Regarding IX GRAVITY SURVEYS

INDEPENDENT

EXPLORATION COMPANY

2011 ESPERSON BUILDING • HOUSTON, TEXAS

POINTING THE WAY
IXC
FOR THE DRILL

Wildcat Drilling in 1940 More Successful

By FREDERIC H. LAHEE
Chief Geologist, Sun Oil Company

THE total number of wildcats drilled in the United States in 1940 was 3038, and the footage drilled was 10,253,948, as contrasted with 2589 holes and 8,624,602 feet, respectively, in 1939. The average depth of hole increased from 3331 to 3375 feet for all states, and from 4145 to 4284 feet in the southern states. More locations were based on technical advice than hitherto, and the percentage of successes increased from 10.4 to 12.0.

This paper reviews data on wildcat drilling for the sixth consecutive year.[1] The states from which information was available are indicated in Figure 1.

The definition of a wildcat as a hole drilled completely outside the known boundaries of pools already developed, and far enough from producing areas to be essentially a test of new possibilities, has continued to be used. Generally speaking, such a hole would be at least 2 or 3 miles from production; but, where subsurface conditions may change within short distances, as in the case of lensing sands and salt dome structures, and where, consequently, predictions based on the known may turn out to be greatly in error, a test hole may be regarded as a wildcat even if it is only ½ or ¾ mile from production or from an abandoned dry hole.

In compiling the data, questions have arisen as to just how to classify footage drilled in certain wells which are strictly neither dry holes nor producers from top to bottom. For instance, within the boundaries of a pool a hole may be drilled below the lowest pay horizon in search of some unknown new pay. In the sense that it is exploring for deeper untested possibilities, its footage drilled below the lowest known pay is wildcat. It might be called a "semi-wildcat." If it discovered oil or gas in a deeper horizon this extra footage might be listed as semi-wildcat discovery footage; and if, on the other hand, it failed to find a deeper pay, the depth drilled below the lowest producing horizon would then be termed semi-wildcat dry footage. For the most part this kind of semi-wildcat footage has been omitted from our statistics. It comprises only a small percentage of the whole.

A somewhat similar case is that of a wildcat well drilled through one or more prospective pay zones to a considerably greater depth and then plugged back to completion as a producer. However, in a hole of this kind, since the total depth would be charged against the cost of the completed producer, we have listed this total depth in the column for producers. Our statistics for 1940 do not always designate plugged-back footage, but in the 9 states where this information was submitted (including California, Oklahoma, and Texas), the total bottom-hole footage plugged off was shown to be 208,761 feet in 153 discovery wildcats—not an inconsiderable percentage of the total producer figures.[2]

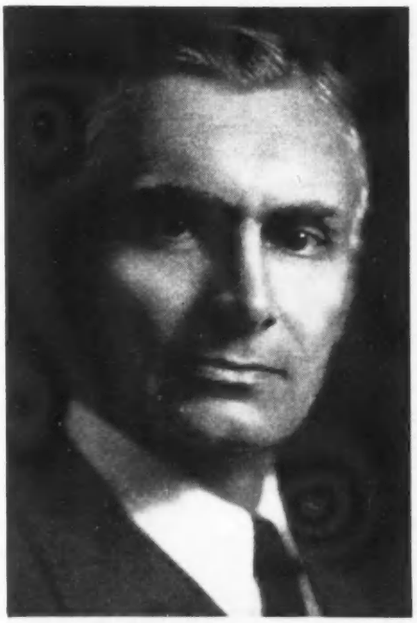
On the maps (Figures 1 and 2), numbers in parentheses indicate total footage drilled; figures preceding parentheses indicate the number of holes drilled; figures above the cross line are for producing wells, both oil and gas; and figures below the cross line are for dry holes.

In the states covered in this review, as shown in Figure 1, and listed in Table 1, during 1940 a total of 10,253,948 feet was drilled in 3038 holes, divided as follows:

366 producers .....1,411,530 feet
2672 dry holes.....8,842,418 feet

This means that 12.05 percent of the holes drilled, and 13.77 percent of the footage drilled, was successful in 1940. The average depth of hole was 3375 feet.

In the southern states district (Figure 2), in 1940, a total of



FOR years the industry wondered how efficient it had become, as a whole, in prospecting for new fields. There were no figures available on this phase until Dr. Frederic Henry Lahee conceived the idea of meticulously and painstakingly separating wildcat operations from other completions. Starting in 1936 he tabulated the number of wildcat producers completed against the total number of wells drilled in unproved areas; thus establishing a definite means of measuring the industry's efficiency in finding new producing reservoirs. He has continued this work annually.

Dr. Lahee is chief geologist for Sun Oil Company, Dallas. He received A.B., A.M., and Ph.D. degrees from Harvard University, and was an instructor in this school for a number of years and later at Massachusetts Institute of Technology. He joined the United States Geological Survey in 1915. A position of geologist with Sun Oil Company was accepted in 1918, and two years later was head of the firm's geological department.

6,279,857 feet was drilled in 1466 holes, divided as follows:

187 producers ..... 919,506 feet
1279 dry holes.....5,360,351 feet

In this area, then, 12.76 percent of the holes drilled, and 14.64 percent of the footage drilled, was successful. The average depth of hole was 4284 feet. For comparison with statistics for this same area in 1938 and 1939, see Table 2.

Selection of the location for a wildcat well may be based on geology (surface geology, subsurface geology, trend along known structural or stratigraphic conditions, local or regional, or shallow exploratory drilling); or it may be based on geophysics (exploration by seismograph, torsion balance, gravity meter, magnetometer, et cetera);

TABLE 1
Number of Oil Wells, Gas Wells, and Dry Holes, Drilled as Wildcats in 1940

STATES	OIL DISCOVERY		GAS DISCOVERY*		DRY		Total Number of Holes	Total Footage Drilled	Average Depth of Hole†
	Number of Holes	Footage Drilled	Number of Holes	Footage Drilled	Number of Holes	Footage Drilled			
Alabama	....	.....	....	.....	14	151,493	14	151,493	....
Arkansas	7	16,880	2	17,220	30	114,726	39	148,826	3,816
California	6	28,587	2	23,114	96	487,588	104	539,289	5,185
Colorado	....	.....	....	.....	1	2,163	1	2,163	....
Florida	....	.....	....	.....	1	4,822	1	4,822	....
Georgia	....	.....	....	.....	3	2,721	3	2,721	....
Illinois	48	121,342	....	.....	475	970,669	523	1,092,011	2,088
Indiana	17	28,600	5	7,460	90	160,599	112	196,659	1,756
Iowa	....	.....	....	.....	2	4,160	2	4,160	....
Kansas	22	71,717	1	3,425	122	408,887	145	484,029	3,338
Kentucky, West	6	6,777	....	.....	42	56,336	48	63,113	1,315
Louisiana	27	132,930	14	104,863	133	810,271	174	1,048,064	6,023
Michigan	22	40,735	4	4,975	328	652,135	354	697,845	1,971
Mississippi	4	22,773	....	.....	105	510,324	109	533,097	4,891
Missouri	....	.....	....	.....	14	22,977	14	22,977	....
Montana	....	.....	....	.....	5	16,216	5	16,216	....
Nebraska	....	.....	....	.....	28	69,312	28	69,312	2,475
NW. New Mexico	....	.....	....	.....	4	10,972	4	10,972	....
SE. New Mexico	6	14,270	3	6,138	26	63,161	35	83,569	2,387
Ohio, NW	....	.....	....	.....	8	13,528	8	13,528	....
Oklahoma	35	133,291	6	14,744	144	534,822	185	682,857	3,702
So. Dakota	....	.....	....	.....	1	7,908	1	7,908	....
Tennessee	3	2,041	....	.....	25	31,214	28	33,255	1,187
Texas	98	461,567	26	142,865	967	3,702,833	1,091	4,307,265	3,948
Wyoming	1	1,676	1	3,540	8	32,581	10	37,797	....
Total	302	1,083,186	64	328,344	2,672	8,842,418	3,038	10,253,948	....

* Gas and distillate wells are included under gas wells.
† Averages have been recorded here only for states where more than 25 holes were drilled in 1940.

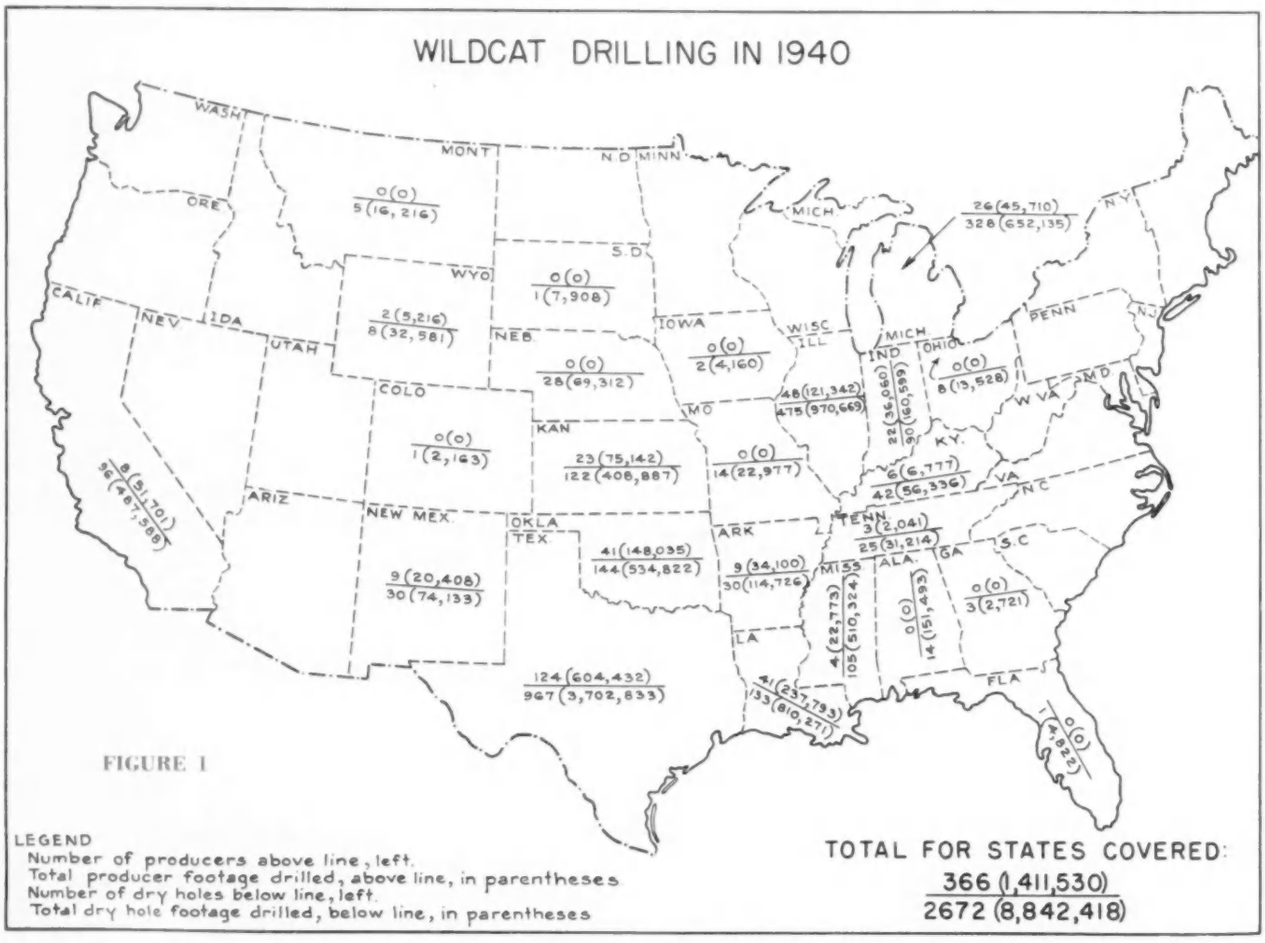


FIGURE 1

TABLE 2
Comparative Statistics for all States Shown in Figure 2

	PRODUCERS DRILLED				DRY HOLES DRILLED				Total Number Wildcats Drilled	Average Depth of Hole (Feet)	Number of Dry-Hole Feet Drilled for Each Producer Foot
	Holes		Footage		Holes		Footage				
	Number	Percent	Feet	Percent	Number	Percent	Feet	Percent			
1938	200	13.6	984,262	17.4	1,271	86.4	4,667,402	82.6	1,471	3,842	4.74
1939	161	12.6	779,345	14.8	1,113	87.4	4,501,669	85.2	1,274	4,145	5.90
1940	187	12.8	919,506	14.6	1,279	87.2	5,360,351	85.4	1,466	4,284	5.83

FIGURE 2

WILDCATS, 1940

or it may be based on some nontechnical suggestion or requirement, such as "creekology," "hunch," "doodlebug," promotion, lease obligation, reported showing of oil or gas in holes previously drilled, et cetera. In many cases the reason for choosing the location can not be ascertained.

In Table 3 are listed the reasons for drilling the wildcats in 1940 using the best information available from men familiar with such statistics, each in his own state or district. According to these figures, 320 wildcats drilled on technical advice (geology and/or geophysics) were successful (oil or gas), and 1731 were dry; 35 holes located for nontechnical reasons were producers, and 797 were dry; 11 producers and 144 dry holes were located for reasons unknown. These figures show that 15.6 percent of the holes drilled on technical advice were producers as contrasted with 4.2 percent successful in the case of the holes located without technical advice. Therefore, in 1940 locations based on technical recommendations were 3.7 times as successful as those drilled without such advice. In the southern states (Figure 2), 4.4 percent of the wildcats, located without technical advice, were producers, whereas 15.0 percent of the holes located on technical advice were producers.

Comparing last year's figures[3] with figures for 1940, we not the following conspicuous changes:

1. The number of dry holes drilled in Kansas increased from 74 to 122; the dry-hole footage, from 258,031 feet to 408,887 feet;

TABLE 3
Basis for Locating Wildcats Drilled in 1940

STATE	GEOLOGY		GEOPHYSICS		GEOLOGY & GEOPHYSICS		SUNDRY NON-TECHNICAL		UNKNOWN		TOTALS	
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry
Alabama	....	1	....	1	....	2	....	10	....	....	....	14
Arkansas	5	8	4	9	....	....	....	....	....	13	9	30
California	5	45	2	10	1	13	....	27	....	1	8	96
Colorado	....	....	....	....	....	....	....	....	....	1	....	1
Florida	....	1	....	....	....	....	....	....	....	....	....	1
Georgia	....	....	....	....	....	....	....	3	....	....	....	3
Illinois	12	140	32	107	1	11	2	168	1	49	48	475
Indiana	10	47	1	4	6	7	....	12	5	20	22	90
Iowa	....	....	....	1	....	....	....	1	....	....	....	2
Kansas	12	41	3	12	1	5	7	64	....	....	23	122
West Kentucky	6	33	....	....	....	....	....	9	....	....	6	42
Louisiana	23	66	18	61	....	1	....	4	....	1	41	133
Michigan	15	159	....	1	....	....	9	156	2	12	26	328
Mississippi	3	16	1	43	....	1	....	45	....	....	4	105
Missouri	....	3	....	....	....	....	....	3	....	8	....	14
Montana	....	4	....	....	....	....	....	....	....	1	....	5
Nebraska	....	8	....	1	....	....	....	19	....	....	....	28
New Mexico	6	20	....	1	....	....	3	7	....	2	9	30
Ohio (NW)	....	....	....	2	....	....	....	3	....	3	....	8
Oklahoma	23	56	12	30	....	....	5	54	1	4	41	144
South Dakota	....	1	....	....	....	....	....	....	....	....	....	1
Tennessee	3	4	....	....	....	2	....	17	....	2	3	25
Texas	73	549	27	162	13	37	9	194	2	25	124	937
Wyoming	2	2	....	1	....	2	....	1	....	2	2	8
Total	198	1,204	100	446	22	81	35	797	11	144	366	2,672

whereas the number of discovery wells remained almost unchanged.

2. In Louisiana there was a gain in discovery wells, from 15 to 41, whereas the number of dry holes increased only a small percentage, from 125 to 133.

3. There was a tremendous increase in drilling in Mississippi, but almost entirely in dry holes, which increased from 16, with a total of 67,195 feet in 1939, to 105, with a total of 510,324 feet in 1940.

4. Oklahoma wildcat drilling showed a considerable increase, with 41 producers (148,035 feet), and 144 dry holes (534,822 feet), in 1940, as contrasted with 21 producers (82,272 feet) and 91 dry holes (388,470 feet) in 1939.

5. Texas had a small percentage gain in dry holes (from 906 to 967), and a small percentage loss in discovery wells (from 131 to 124), with a net gain in wildcats from 1037, in 1939 to 1091 in 1940.

6. The number of successful holes (discovery wells) out of the total number of wildcats drilled on technical advice rose from 13 percent in 1939 to 15.6 percent in 1940; and, on the contrary, successful holes drilled without technical advice decreased from 6 percent of the total number of wildcats drilled in 1939 to 4.2 percent of the total number in 1940, thus indicating a decided advantage on the side of technical advice.

7. Last year[4] we called attention to the fact that, whereas in 1937 there were 3 times as many discovery wildcats drilled on technical advice as there were drilled for non-technical reasons, in 1938 this factor had decreased to between 2.2 and 3.2, and in 1939 it had further decreased to between 1.5 and 2.2. Reasons were suggested for this condition. In 1940, we find that this factor has jumped to 3.7. There has been a stronger tendency than hitherto to seek technical advice before selecting a wildcat location, and especially is this true where deep drilling is contemplated.

Our readers may be interested to have a few details, not appearing in the accompanying tables, with reference to the distribution of certain types of technical recommendations applied in locating wildcats during 1940. 793 locations were made on subsurface geology as compared with 155 made on surface geology. 431 locations were based on seismographic work, mostly reflection shooting, whereas the remaining 115 locations listed under geophysics in Table 3 were based on the other types of geophysical exploration. Subsurface geology is by far the most important guide for selection of wildcat locations.

The writer acknowledges with thanks the kind assistance and cooperation of the following gentlemen in compiling data for this summary: A. P. Allison, L. J. Bateman, A. H. Bell, K. E. Born, N. Burnett, G. E. Burton, D. H. Cardwell, C. H. Coldwell, R. J. Cullen, G. F. Fix, M. H. Funk, G. C. Gester, E. A. Koester, C. S. Lavington, G. D. Lindberg, A. M. Lloyd, R. W. Mallory, D. J. Munroe, G. W. Myers, Jack Parker, C. H. Row, G. C. Sleight, L. C. Smith, S. D. Sumerford, and E. B. Wilson.

[1] See A.A.P.G. Bulletins, Vol. 21, pp. 1079-82; Vol. 22, pp. 645-48, 1231-35, 1236; Vol. 23, pp. 789-94; Vol. 24, pp. 953-958, for preceding articles.

The accompanying article will be published in the forthcoming June issue of the A.A.P.G. bulletin, and is to be read by title at the association meeting in Houston this week.

[2] The reader is reminded that these figures of 153 wells and 208,761 feet are included in the figures of 366 producers and 1,411,530 producer feet, respectively, in Table 1.

[3] Wildcat Drilling in 1939, by F. H. Lahee. Bull. Am. Assoc. Petr. Geols., Vol. 24, pp. 953-958. Also published The Oil Weekly, April 8, 1940.

[4] Op. cit., p. 958.

THERE is nothing magic about seismic exploration. It is a fundamentally sound prospecting method which can be made to return big dividends.

The greatly improved service offered by General has evaluated millions of acres of leases. It has shed new light on old surveys. It has located fields where none were thought to exist before.

We should like to discuss with you frankly and intelligently the possibilities as well as the *limitations* of seismic exploration as applied to your particular problem. A 'phone call, wire or letter will receive prompt attention.

General Geophysical Co.

GULF BUILDING • HOUSTON

Trained and experienced field crews for prospecting anywhere in the United States and abroad.

Not only heads of geological departments, but all executives, and those hoping ultimately to be executives, can profit from this very practical article.

Organization and Administration of Geological Departments

By SHIRLEY L. MASON, Geologist
Stanolind Oil & Gas Company

SHIRLEY L. MASON received his A. B. degree from Harvard in 1915; M. S., Pittsburgh in 1919; Diploma, Imperial College, London, 1923, and Ph. D., Harvard, 1932. He has been geologist for Johnson, Huntley and Somers, in Bolivia; field geologist, Imperial Oil Company, Colombia; subsurface geologist, Rycade Oil Corporation, Houston; geologist Iraq Petroleum Company, Iraq; consulting geologist and partner, Huntley and Huntley, Pittsburgh; geologist, Sinclair Oil Company, Portuguese West Africa, and at present is subsurface geologist for Stanolind Oil & Gas Company at its Gulf Coast headquarters at Houston. His writings include "Effects of Structure Upon Oil and Gas Production in the Osage"; "Rumanian Oil Fields"; "Geology of Prospective Territory in Republic of Turkey"; "Colombian Oil Fields," and "Barite Pisolites from Batson and Saratoga."

THE organization of a geological department is not only a problem to the executive who is considering starting one, but also to those responsible for the effectiveness of departments now in operation. The present discussion is designed to make suggestions that might be helpful to anyone who is interested in having the geological department as useful as possible.

It is readily apparent that there can be no chart outlining a geological department that will serve as an ideal in all cases, or perhaps even in more than a single instance. Not only is it true when comparing very small departments with very large ones, but the organization of a large department engaged primarily in surface mapping with each geologist working more or less as a separate field unit, would differ considerably from a well-integrated unit of the same size doing a negligible amount of surface mapping and having to correlate the specialized services of the different men. The geological department must work advantageously with other departments of the company, and as these other departments operate differently in different companies, the geological organization should vary.

This does not mean that because an organization is established as being fitted to the particular company's need, there is no room for improvement. *It is doubtful whether there are many departments, at least among those that have been operating a considerable time, where, mingled imperceptibly with arrangements fitted to special needs, there are not some things that are hold-overs from operating conditions that have disappeared. Or it may be that recently developed methods are handled more awkwardly than they should be because there has been no adequate revision of the system since they were established.* It is hoped that this discussion will stimulate the recognition of some of these. The generalizations given are unlikely to apply specifically, but in considering them—even in disagreeing with them—some possible improvement in the reader's own organization may come to light.

The problems of all geological departments bear enough relation to each other that for the most part they cannot be put in distinct categories. There is sufficient difference, however, between departments composed to all practical purposes of a single individual and those with a number of trained geologists that they should be considered separately.

It is often necessary for an independent operator, whose work does not justify the salary of an experienced geologist as regular member of his staff, to decide between the occasional services of a consultant and the hiring of a recent graduate whose salary he can afford. There is no rule that could cover all cases, but some examples might help. If the need for geological service is in the consideration of widely scattered areas for exploration, the relatively high fees of a consultant, or of different consultants for different areas, would be

the best investment. On the other hand, where the need for geological service in exploitation in one or two partially developed fields, the hiring of an intelligent beginner would be preferable. In the first case, the need for a seasoned judgment as the basis for the risk of a large investment makes the fact that the fee is high for the short time involved, unimportant. In the second case, the young man has a definite set of problems to master. Once he is oriented, his constant watching of developments and close familiarity with details would be of more value than the sporadic services of the more experienced consultant whose interest was elsewhere between times.

A firm with somewhat larger operations will find a solution in having the full-time services of an experienced geologist. In addition to the man's ability, his personality is of particular importance where he constitutes the entire geological staff. Whereas, in a large department an able man can be utilized in a position where his contacts are limited to the rest of the staff who will make allowances, the lone geologist must not only "sell" his ideas and work effectively with the other departments but he has more frequent calls to represent the firm with outsiders. These things normally would be considered in selecting him, but there is one more necessary group of contacts that should be taken into account. A single individual cannot keep the geology of a large district worked up currently and it is essential that he "swab" effectively when need arises. Effectiveness along this line is dependent on his being respected by the geologists with other companies. A "live-wire" whose geological reputation is regarded as fictitious by the others would be much less valuable in this regard than a more stolid individual who was generally respected. The ideal, of course, is a vigorous attractive individual whose worth is real and recognized.

Need Authority to be Effective

Hiring the right geologist does not end all the responsibility of the firm. He must be given enough authority to make his work effective. Oil companies frequently start as drilling companies and there is a tendency to run them from the drilling end. If the geologist has little or nothing to say in the decisions as to locations, coring, testing, etc., much of his usefulness is wasted. Also the budget for geological work should not be limited to his salary. The more assistance he has from less expensive help, draftsmen, stenographers, etc., the more time he has free for geological work that he alone can do. There must be an allowance for tools he needs; in addition to maps, electrical logs, etc., there may be reports from consulting paleontologists and even in some cases, surveys by geophysical companies. If the right man is obtained, he will have the best idea as to the true economy of these extra expenditures.

It is with departments having several or many geologists that problems of organization arise. The ideal organization is that which is systematized to the point of highest efficiency but not beyond. There is little choice between a department where work of individual members is not readily available to the others and a department where most of the time is spent in filling out and checking forms. The errors from lack of information and the needless reduplication of work in the one are fully matched by the wasted time and stupefying effect of the other; *the neat completion of a long routine operation is dangerously satisfying.*

Part of the difficulty in systematizing lies in the fact that geology is a science, demanding constant investigation and a continual changing of hypotheses. The problem cannot be simply solved by setting up a research department to take care of the theories, leaving the working department restricted to the "practical." If the company is big enough to support a research department, more or less outside of the regular department, it has its place in that there are some problems which need full-time application if progress is to be made on them in a reasonable length of time; however, the geological department itself should not be divided this way. With most geologists a mixture of routine detail with the consideration of general problems is the most productive of results. Straight research needs an unusual type of mind if practicable results are to be obtained. The plodding researcher of Edison's "sweat" system is too frequently mired down in the endless variables of geological conditions. All too rarely can he find controlled conditions to serve as the necessary yardstick. The brilliant man with the uncanny flair for recognizing inconspicuous trifles that mark hidden trails to unsuspected new fields, usually can maintain interest only so long as the problem is exciting. The abilities of such men can be utilized best if they are in close contact with the rest of the staff.

Need No Prodding

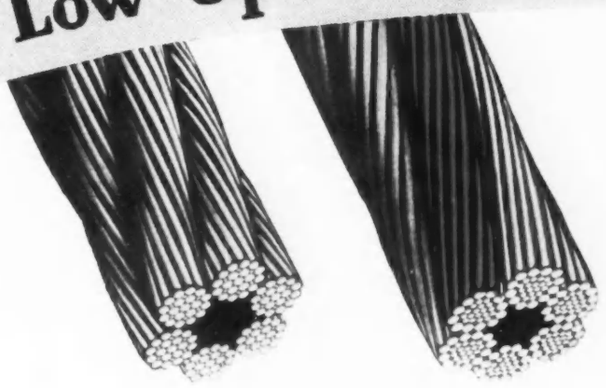
On the other side the "working" geologist needs the stimulus of constant puzzling to keep him well alert. Fortunately most men in the profession need no prodding. It has been a source of amazement, the uniformity with which men even when engaged in the most routine tasks, like "walking out" outcrops in the old days, invariably were pondering on less evident problems. It is also to the credit of the profession that their cogitations practically never are carried on at the expense of the work in hand. This is true enough that a single instance in over twenty years active association with geologists is a vivid memory. In this case, the long hours of rapt gazing over the field area assigned, did result in a smaller amount of no more accurate mapping than was done by associates.

Most of these "outside" mental exercises serve no immediate purpose save the satisfaction of the individual and his improvement as a geologist. All too frequently they are along lines that would be of definite benefit to the company, but, with the press of duties, are laid aside in an outline stage for "some day when there is time." A flexible schedule that would allot the man a certain portion of his time for his pet problem, in addition to his routine duties, would make that benefit available. It would also make the man more valuable as the completion of the problem calls for a mental energy that is not necessarily involved in the routine chores which tend to become a combination of mechanical calculations and judgment derived from past experience, nor involved in the intuitive guesses and random selection of supporting data on which the original outline of his problem was prepared.

Thus the organization of the department must be set up so that the necessary routine is done in a responsible manner as expeditiously as possible, and yet with the geologists all free to spend part of their time on unsolved problems. It would seem equally advisable to have the reverse true, i.e., all spend

You Can Depend On "HERCULES" (RED STRAND) WIRE ROPE For Low Operating Cost

REG. U. S. PAT. OFF.



Domestic Distributors

AMERICAN SUPPLY CO.
Kilgore, Texas

CASEY & NEWTON
901 Century Bldg., Pittsburgh, Pa.

GUSTIN-BACON MFG. CO.
Kansas City, Fort Worth, Houston, Tulsa

F. HAMILTON CO.
Bradford, Pennsylvania

HERCULES SUPPLY CO.
Fort Worth, Corpus Christi, Kilgore, Houston

HILLMAN-KELLEY, INC.
2441 Hunter St., Los Angeles, Calif.

KIMBELL-BOSTIC SUPPLY CO., INC.
Wichita Falls, Texas

THE B. LEVY ESTATE
Titusville, Pennsylvania

MURRAY-BROOKS HARDWARE CO., LTD.
Houma, New Iberia, Ville Platte, Lake Charles, Louisiana

NADEAU BROTHERS CO.
Cut Bank, Montana

NORTH TEXAS HARDWARE CO., INC.
Vernon, Texas

PARKERSBURG SUPPLY CO.
Parkersburg, W. Virginia

UNION PIPE & SUPPLY CO., INC.
Owensboro, Kentucky

UNITED PIPE & SUPPLY CORP.
Charleston, W. Va.

UNITED SUPPLY & MFG. CO.
Tulsa, Oklahoma City, Stonewall, Chase, Kans.; Hutchinson, Kans.; Eunice, N. M.; Denver City, Tex.; Edna, Tex.; Houston, Tex.; Sundown, Tex.; Odessa, Tex.; Pampa, Tex.

WELL MACHINERY & SUPPLY CO., INC.
Fort Worth, Texas

WESTERN MACHINERY CO.
Salem, Ill.

Export Distributor

CONTINENTAL EMSCO CO., INC.
30 Rockefeller Plaza,
New York, N. Y.
Branches: Buenos Aires, London, Ploesti

PRODUCTION requirements must be met. Why not let "HERCULES" (Red-Strand) Wire Rope help you meet this demand and still maintain a reasonable margin of profit?

You can rely on "HERCULES" to keep costs down, because it is made on the principle that—"*With wire rope it pays to use the best*" . . . In its entire process of manufacture, exacting tests and rigid inspections leave nothing to chance. All this, plus manufacturing efficiency, means longer rope life at no higher cost.

You will quickly discover that "HERCULES" (Red-Strand) Wire Rope is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production. Specify it on your next requisition.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

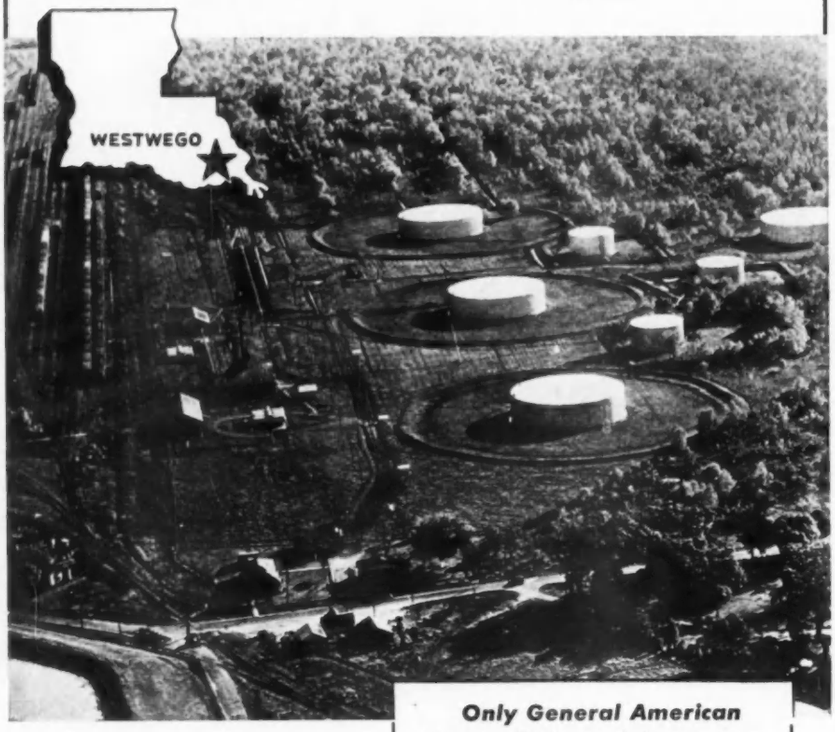
WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK . . . 90 West Street
CHICAGO . . 810 W. Washington Blvd.
DENVER . . . 1554 Wazee Street

SAN FRANCISCO . . 520 Fourth Street
PORTLAND . . 914 N. W. 14th Avenue
SEATTLE . . 3410 First Avenue South

Go Westwego—— and miss the Mississippi



Producers of bulk liquids west of the Mississippi can ship via New Orleans with no river-crossing charge, thanks to General American's Westwego Terminal. This modern plant brings you seven ***exclusive*** advantages — gives you complete facilities without investment on your part. Tailored to suit your needs, great or small, General American Service will save you money every day—every way!

Only General American Gives All These Advantages:

1. NO CONTAMINATION. Separate pumps, lines, storage zones for dissimilar commodities.
2. MODERN PROTECTION. Latest safety appliances; lowest insurance rates, minimum evaporation losses.
3. RELIABLE CUSTODIANSHIP. Our warehouse receipts are highest type of collateral everywhere.
4. INDEPENDENT OWNERSHIP. Strictest privacy; we do not buy, sell or refine any commodities.
5. NO WHARFAGE. There is no wharfage charge at our own private docks.
6. SPEED WITH SAFETY. Day and night crews, complete facilities, eliminate all shipping delays.
7. WORLD'S LARGEST TANK CAR FLEET. One car or hundreds, wherever and whenever needed.

Strategically located to serve you!

GATX GENERAL AMERICAN

GENERAL AMERICAN TANK STORAGE TERMINALS

Goodhope, La. and Westwego, La., (Port of New Orleans)
Corpus Christi, Texas
Carteret, N. J. (Port of New York) Galena Park, Texas (Port of Houston)

A DIVISION OF GENERAL AMERICAN TRANSPORTATION CORPORATION

part of their time on routine detail. *It is a very salutary antidote for the omniscience which goes with general theorizing to have mistakes in detail work recognized.*

The allotment of the work will necessarily vary with personalities and capabilities of the men. It would be a mistake, simply because a man was hired with definite field in view to limit his usefulness to that, if he shows additional abilities elsewhere. Fortunately the men themselves usually see that it does not happen. Hired as a geophysicist or as a paleontologist, a man with definite geological ability and interest usually will be found to have evolved himself a hybrid position which allows scope in both directions. These men are likely to be extremely useful but it may be well to check and make sure that there is at least one good man whose main interest and energy is devoted to the branch for which they were hired; otherwise that field may not be exploited to the extent for its possible usefulness.

In addition to the above considerations which are more or less peculiar to geological departments, there are those which apply to all organizations: the avoidance of friction and jealousy by definite division of responsibilities and a clear understanding as to whom each man reports; maintaining ambition by holding salary schedules at least equal to similar offices, with as frequent raises in recognition of the employee's progress as possible and by meticulous effort to see they get individual credit for work done; and clearing the desks of the men in higher administrative positions of as much routine paperwork as possible, particularly of all that which could be as well done by responsible clerks.

When it is all done there is no fixed gauge for measuring the efficiency or effectiveness of a geological department. A good record for finding oil fields might be an indication, but there have been instances where that has been achieved simply in doing the best they could with what a fast-talking lease-broker sold to the management. The best criterion is one's own satisfaction with the department. If things go smoothly, with small turnover of personnel and everyone showing real interest, if few opportunities that should have been considered are missed, and a proper number are capitalized on, it would seem that it is a good department.

Geophysical Prospecting Follows Varied Pattern

By DR. E. A. ECKHARDT
Assistant Director, Gulf Research & Development Company

GEOPHYSICAL activity during 1940 followed a varied pattern. The foreign operations of American companies were curtailed severely in view of the increasing obstacles resulting from the spread of the war. Such operations came almost to a complete stand-still in the Eastern Hemisphere. In South America the volume of work also was reduced severly from former levels, but the level actually maintained was appreciable.

As in former years, the seismograph operations represented the largest part of the geophysical campaign in both parties in use and in expenditures. The fluctuations from a minimum of 173 to a maximum of 203 seismograph parties operating in the United States were greater than recent years, but the average of approximately 188 was only nominally below that of 1939.

In 1940 Texas was by a considerable margin the major theater of seismograph activity. The operations within its borders constituted 41 percent of the total. This represented a 20 percent increase over 1939 and a 10 percent increase over 1938, all figures being approximate. The state in which seismograph operations were started and in which they have been most intensively prosecuted has not only reversed the down-trend of recent years but has attained a new peak of seismograph activity. It is, after all, both the biggest state and the biggest oil domain of these United States. These statistics must be especially interesting to those who loudly proclaimed some years ago that both the state and the seismograph were over the hump.

The geophysical campaign in Mississippi reached its peak during the first half of the year, at which time there probably was a concentration of geophysical parties in the central part of the state greater than ever attained at any time anywhere. But the invasion volume and "blitzkrieg" tempo had pretty well worn themselves out by the end of the year. Current activity is at less than half the peak rate.

E. A. ECKHARDT, lecturer in geology and geophysics at the University of Pittsburgh, is a graduate of the University of Pennsylvania: B. S., 1908; Ph. D., 1912. Following graduation, he was Harrison Research Fellow, Gottingen, Germany, 1912-13; assistant professor of physics, University of Pittsburgh, 1908-17; assistant to senior physicist, United States Bureau of Standards, 1917-25; assistant chief, research department, Marland Oil Company, 1925-28; assistant director, Gulf Research & Development Company, 1929-. His technical contributions include: Military research, United States Bureau of Standards, developments of methods and apparatus for acoustical measurements; ranging by sound and radio; radio longitude determinations; projectile chronographs and other ballistic research instruments; building and auditorium acoustics; gravity and seismograph development for geophysical exploration.

Though continuing at a substantial rate, seismograph work in Louisiana continued its gradual decline of recent years, in spite of which fact it was by a small margin second only to Texas in volume of activity by the seismographers.

Seismograph operations in Oklahoma have continued at a rather steady average level in recent years. The rate during 1940 was definitely higher, however, exceeding that of the preceding years by roughly 30 percent, a handsome percentage gain.

In California seismograph operations tapered off gradually and during 1940 averaged only about two thirds of the average 1939 rate. At the end of the year the 12 parties remaining in service represented only about half the number which started the year.

A similar decline took place in the northeastern states where the rate of activity was materially below that of the previous year.

Since the aggregate of seismograph work suffered only a negligible decline, emphasis in some areas was compensated by deemphasis in others. Texas and Mississippi were the principal gainers, California, Illinois and Louisiana the principal losers.

Gravimeter operations reached a new all-time high during 1940 with a maximum of 66 parties reported at any one time and an average of 56 in continuous service during the year. At one time nearly half the total was reported to be operating

Arsenal

for All Democracies

OIL is as vital as explosives in today's mechanized warfare. Our expanding air, land and sea forces are reassuringly supported by the facilities and vastness of America's Oil Industry — a factor which may decide the outcome of today's conflict. The Banks of Fort Worth more than ever are eager to support the Oil Industry — and pledge friendly, helpful cooperation to further the defense of our Nation **. . . now the Arsenal of all Democracies.**

THE FIRST NATIONAL BANK
THE FORT WORTH NATIONAL BANK
CONTINENTAL NATIONAL BANK

Above: Bombing planes that will be built in Consolidated's new $10,000,000 plant at . . .

FORT WORTH

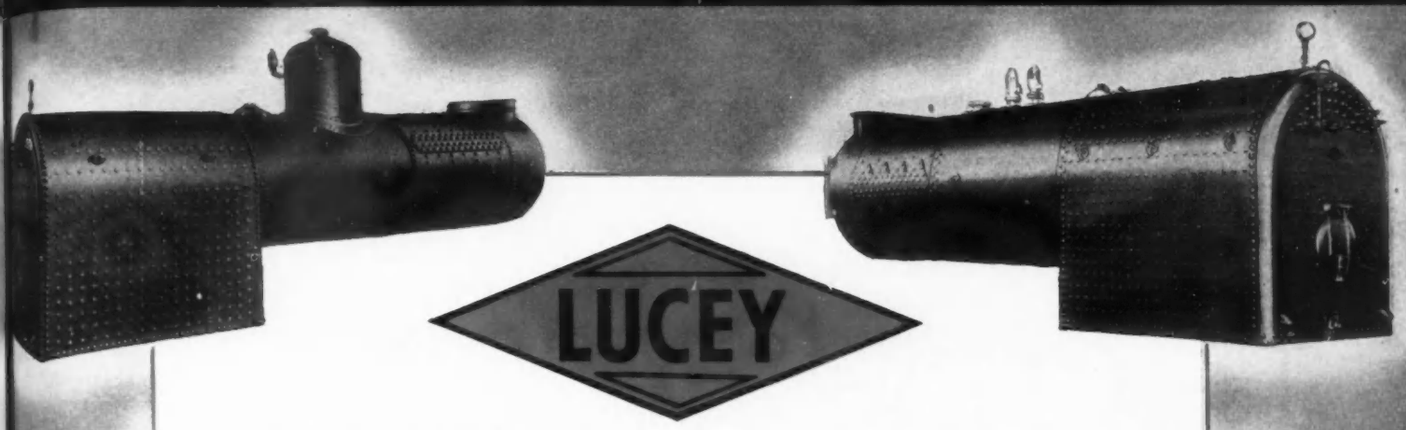
in Mississippi. In view of the much greater rate of area-coverage per gravimeter instrument as compared to the torsion balance, the new peak in gravity operations represents a rate of gravity survey far in excess of anything previously accomplished. The expansion of gravimeter use is one of the note-worthy geophysical occurrences of the past year.

In the aggregate of relatively small volume, the magnetometer work done last year is nevertheless worthy of note. This geophysical method seems to be emerging from the "dog-house" to which it had been undeservedly banished by those who experienced disappointment as a result of its misuse. In any event, if the slow but steady growth in the volume of magnetometer field operations is a safe criterion, the magnetic method again may regain the place of respectability to which it is entitled by its inherent qualities.

United States Leader

The United States has occupied a position of pre-eminence in the development and utilization of applied geophysics during the past 15 years. It is somewhat surprising that under the circumstances it was not until 1940 that an American book on geophysical prospecting appeared. Within a few months three books were announced by their publishers. "Geophysical Prospecting for Oil," by L. L. Nettleton (McGraw-Hill, N. Y., 650 pp., $5.00) is the only one restricting its scope to the prospecting for oil. "Exploration Geophysics," by J. J. Jakosky (Times-Mirror Press, Los Angeles, 786 pp., $8.00) and "Geophysical Exploration," by C. A. Heiland (Prentice-Hall, N. Y., 1013 pp., $10.00) deal with applications to mining and engineering as well as with oil exploration. These books will be of great convenience and value to those approaching or already practicing the profession, and can be recommended to those who have sponsor or administrative interest in the subject.

New geophysical instrument of the year was the under-water gravimeter, of which several were developed. This instrument is designed to be lowered to the bottom of lakes, bays or coastal waters and provides means for accomplishing gravity surveys of water-covered areas where the use of other instruments has proved uneconomic



LUCEY

Lucey Welded Fire Box Oil Country Boilers

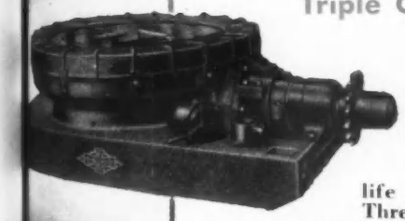
86, 104 & 125 H.P.—250 & 300 Lb. W.P.

Are A.S.M.E. Code and A.P.I. Specifications. Have full size Welded Fire Box with no rivets to overheat or burn. No leaky seams. Short tubes in vertical rows. Effective heating surface. Ample space between Crown Sheet and Outside wrapper.

Wheland-Lucey Oil Bath Swivel . . . E-6500-BA

Designed for deepest wells. Timken Tapered Main Load Roller Bearing. End thrust taken by SKF Ball Bearing located above main load bearing. Two American Roller Bearings located below the main load bearing take radial thrust and insure stem alignment.

Wheland-Lucey Triple Oil Bath Rotaries

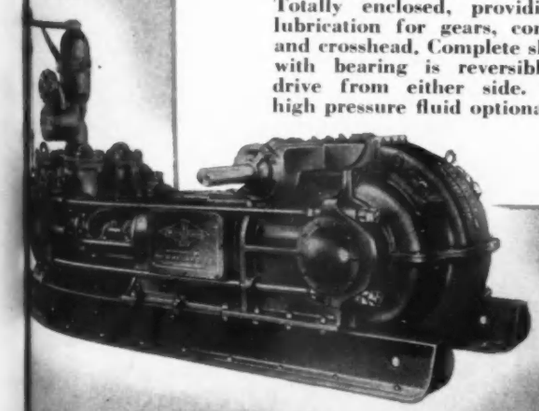


Built in three sizes—27½", 20½" and 17½", providing a machine for any size or depth hole. Designed to give increased performance, greater safety and longer life at higher rotating speeds. Three separate oiling compartments permit proper lubrication for specific areas.

Wheland-Lucey Power Slush Pump

H.P.—15000—CE 7¾" x 18"

For high pressure and deep drilling. Totally enclosed, providing oil bath lubrication for gears, connecting rods and crosshead. Complete shaft assembly with bearing is reversible permitting drive from either side. Standard or high pressure fluid optional.



Lucey Hi-Tensile Strength Oil Country Boilers

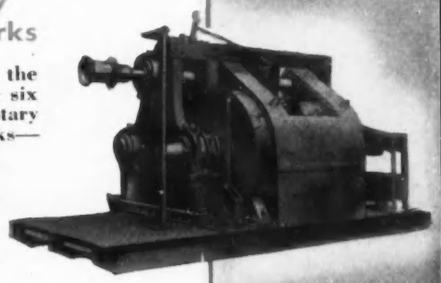
125 & 150 H.P.—300 & 350 Lb. W.P.

Built from high tensile plates for maximum strength with minimum weight. These boilers have Lucey Welded Fire Box—60" wide, 72" high, and 96" long. No dome necessary—but can be supplied. Space above curved Crown Sheet of Fire Box—20".

"Pittsburgh Special Double Grip" Rotary Drill Pipe

All the advantages of shoulder-welding without the disadvantages. Tight-fitting shoulder relieves the last engaged threads on the pipe of destructive vibrations and biting, and seals the joint. Available in either Internal Upset or External Upset—Internal Flush.

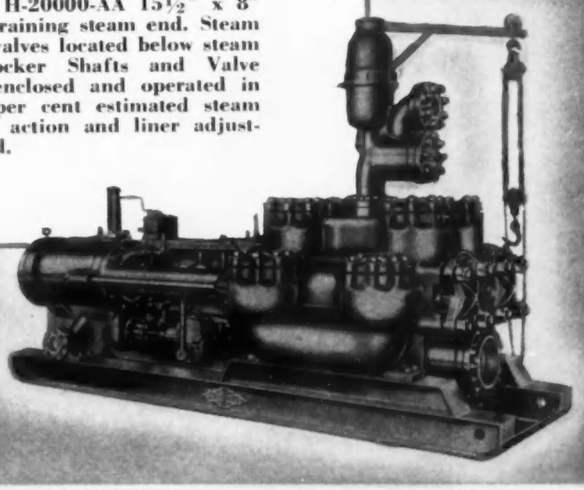
Wheland-Lucey B-3800 Drawworks



Power and speed for drilling the deepest wells. Four speeds or six speeds. All drum and rotary speeds built into Drawworks—no auxiliary speed change equipment needed. With or without sand reels. Self-aligning roller bearings throughout. Water cooled brake flanges and oil tight guards.

Wheland-Lucey 20" Duplex Steam Slush Pump

Built in two sizes, H-20000-BA 16½" x 8" x 20"; H-20000-AA 15½" x 8" x 20". Self draining steam end. Steam and exhaust valves located below steam cylinders. Rocker Shafts and Valve Links fully enclosed and operated in oil. Fifteen per cent estimated steam saving. Valve action and liner adjustment patented.



LUCEY EXPORT CORPORATION

3505 Woolworth Building, New York, N. Y.

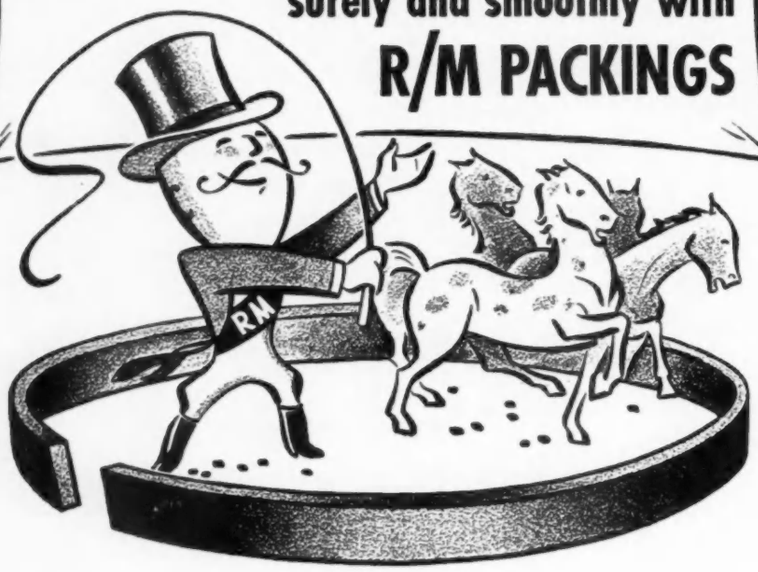
...nd Street House, E. C. 2, London, England
...1 Sterling Building Houston, Texas

OIL WELL SUPPLIES

Calle Defensa 320, Buenos Aires, Argentina
58 High St., San Fernando, Trinidad, B. W. I.

CONTROL YOUR HORSEPOWER

surely and smoothly with R/M PACKINGS



Leaking steam, dripping oil, escaping gas—they're pure waste, sheer signs of lack of control. Whip them back into their channels smoothly and easily with R/M packings. You'll be amazed at the control—the lasting, time-saving, money-saving control they give you.

For R/M packings, immediately available from distributors everywhere, are the proud result of 40 years' specializing in industrial packing problems by the best known name in rubber and asbestos—Raybestos-Manhattan, Inc. The line is remarkably small to be complete—because it contains no duplicates. R/M packings are engineered for the tough jobs, and they stop leaks with the minimum of wear. Call your R/M distributor today—whip those horsepowers into line.

This complete, condensed, cross-indexed catalog will help you specify the exact packing for your job—the right answer to your toughest problem. It's free. Simply call your nearest R/M distributor or write to us.

INDUSTRIAL SALES DIVISION

RAYBESTOS-MANHATTAN, INC.

Makers of Packings for Every Industrial Use

BRIDGEPORT, CONN. MANHEIM, PA. NORTH CHARLESTON, S. C. PASSAIC, N. J.

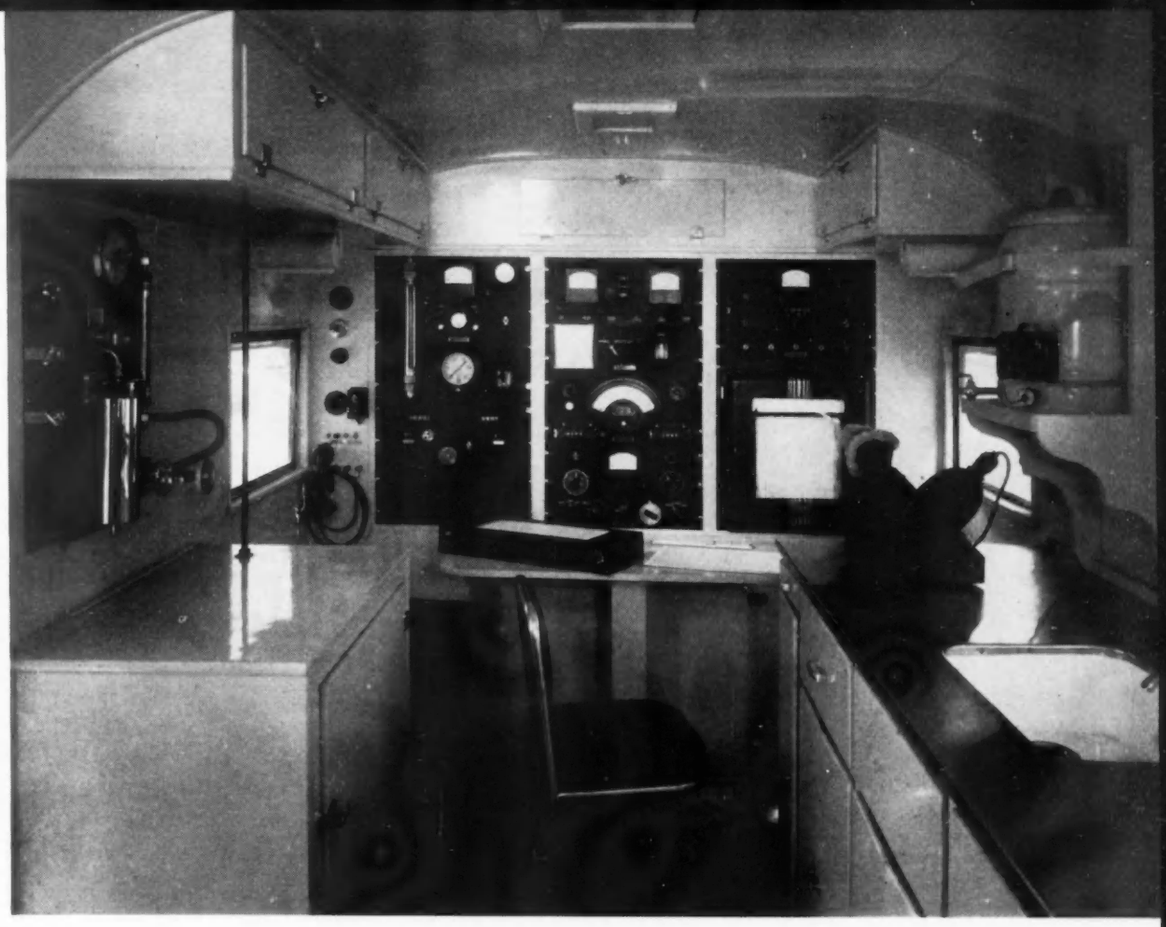
or impracticable. It can be used wherever drilling operations would be feasible. With the addition of the under-water gravimeter, instruments now are available for making gravity surveys anywhere where such surveys could have practical value.

The geo-chemical methods which have been the subject of considerable discussion, which at times developed more heat than light, remain in a somewhat miasmic state. A great deal of work has been done and the number of components present in the surface soils in fractional percents or traces which have been subjected to investigation, has been greatly extended. The information thus secured will no doubt have much practical value in many directions. The subject has, however, definitely suffered from strong-arm attempts to force the data into a pattern which could provide a basis for new methods of prospecting. The developments of 1940 have exhibited a more conservative attitude in the securing and utilization of geo-chemical data.

Radio Activity of Rocks

During 1940 the use of the radioactive properties of rocks as the basis for methods of well logging has been the subject of considerable development. This method permits the logging of formations behind casing, which is difficult for the various electrical methods which depend primarily on the electrical resistivity of the rocks. It is of interest to note that geological papers dealing with subsurface structure are increasingly illustrated with electrical and similar well logs, thus indicating the growing use of geophysical techniques being made by the geologist in the various phases of his profession.

In an age in which there is a tendency to spot-light the new, the value of further developing the possibilities of what we already have does not always make good copy. Nevertheless, the position retained by the seismograph in the oil prospecting picture is not the result of innovations introduced in recent years, but arises out of the breadth and depth of experience which become available only from continued use. In emphasizing the search for new approaches to the prospecting problems, there is danger that we may fail to fully exploit the possibilities of the methods already available to us.



Interior trailer - type mud analysis laboratory, showing fluoroscope unit at right, continuous strip chart, gas detector dials, and controls necessary for accurate check of oil and gas content of mud stream.

Analysis of Mud Returns Locates Oil and Gas Zones

By ELTON STERRETT, Staff Writer

GAS bubbles and oil slicks appearing in the mud-return ditch long have been recognized as harbingers of gas or oil production, but until the recent development of equipment for evaluating these shows, quantative determinations were optical only and depended upon the experience and ability of the observer for translation into pertinent data.

Direct microscopic determinations of oil and gas content formations penetrated now can be made by continuous analysis of drilling-mud returns during actual making of hole, and are proving an important additional geological and engineering tool.

An early application of mud analysis[1] provided for working of samples from the stream at intervals as frequent as conditions dictated, but devices and processes now are available that afford readings of mud contents with no delay other than that inherent in the time-lag between bit and ditch returns. Use of recording instruments permit securing permanent, quick, continuous records of oil and gas shows without interfering with drilling operations.

Application of Mud Analysis

Mud-analysis logging finds particular application in areas where production is from lime or where muds have high saline content. Where coring is difficult or hazardous, or where core recoveries are had, mud-analysis logging furnishes a means of obtaining corroborating data on those formations carrying oil or gas.

In wildcat drilling in hard-rock formations, where drilling is relatively slow, the usual program is to drill ahead for three feet, and then circulate mud until known returns appear from the bottom. Showings thus obtained determine the advisability of coring or going ahead with routine drilling, and prevent the unprofitable coring of shale or other non-productive formations.

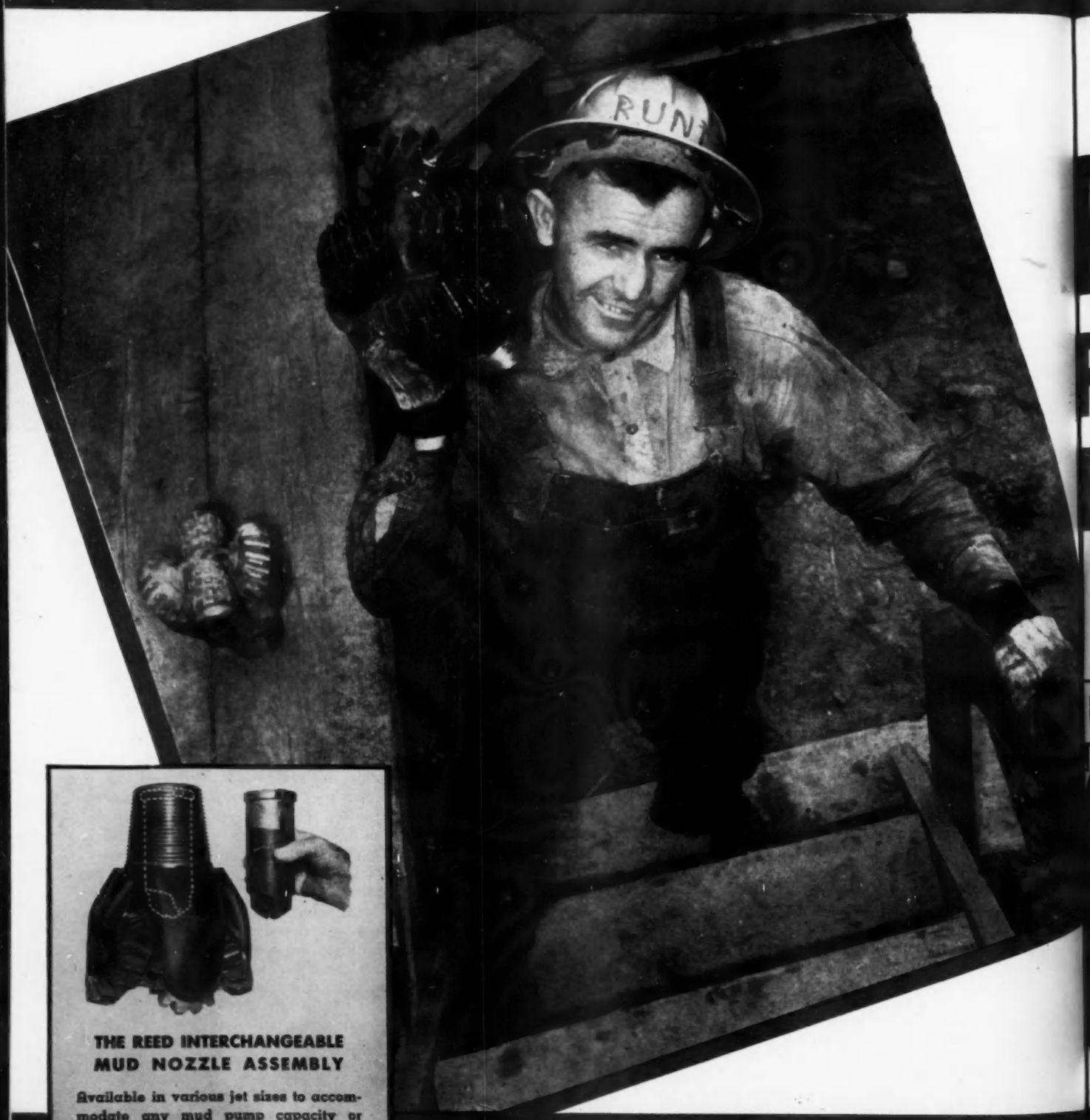
Mud analysis for gas and oil showings is especially well fitted for determining productive formations, and for locating the gas-oil contact, when drilling in formations which have comparable penetration rates, and where no other change in drilling data is observable.

Depths Are Calculated

Since there is a lag between the actual liberation of oil and gas from the formation being drilled and the appearance of these sub-

For

LOWER DRILLING COSTS



THE REED INTERCHANGEABLE MUD NOZZLE ASSEMBLY

Available in various jet sizes to accommodate any mud pump capacity or circulation requirements and may be easily replaced at the rig.

Furnished for bit size range — 5⅞" through 13".

REED

MORE HOLE PER BIT

THE
INDEPENDENTLY
SUPPORTED CUTTERS
OF

REED ROCK BITS

are

UNITIZED

FOR
ADDED STRENGTH
GREATEST SAFETY

THE REED "M" ROCK BIT

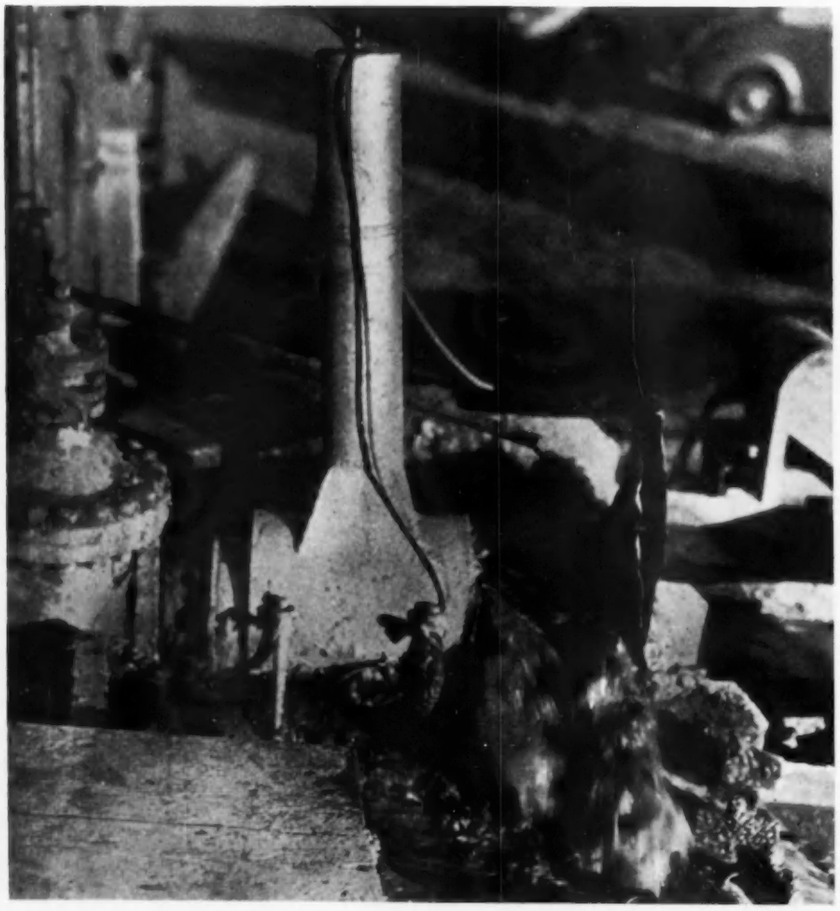
The M Bit has been especially designed, and is recommended for drilling medium hard formations, such as: UNCONSOLIDATED SANDS, SALT, GYPSUM, CHALK, ANHYDRITE, MEDIUM HARD SHALE, and some of the LIME ROCKS which are not extremely hard or abrasive.

In the "Shale and Shell" formations, such as those found in the Mid-Continent, this bit has been proven to have excellent digging qualities.

ROLLER BIT COMPANY

POST OFFICE BOX 2119, HOUSTON, TEXAS • EXPORT OFFICE, 30 ROCKEFELLER PLAZA, NEW YORK

MID-CONTINENT, GULF COAST AND ROCKY MOUNTAIN DISTRIBUTORS FOR MARTIN DECKER PRODUCTS



Gas sampling device with weighted flap valve to maintain full volume of mud within the flow stream and prevent admission of excess air.

stances at the surface, results obtained from mud analysis must be checked against drilling speed to permit the results to be correlated with the actual depth of the formation under observation. By plotting drilling speed per hour, measured on the kelly or independently checked, against the chart of mud return analyses, corrections being made to allow for the cumulative delay incurred in reaching the surface as the hole becomes progressively deeper, direct relationship may be established between the geology of the hole and the oil and gas characteristics.

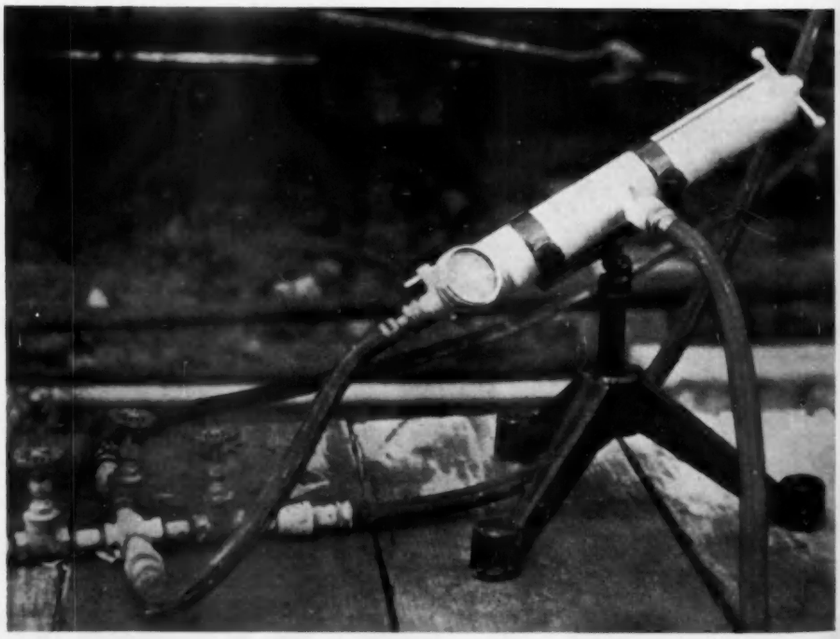
Drilling mud, as determined for average Gulf Coast wells, carries an admixture of air, intimately blended with it in the agitated passage of the stream of mud down the ditch. This air largely separates from the fluid before reaching the slush pump suction, but may be regarded as continuously occupying a minimum of 0.0025 percent of the mud volume. Additional lightening material, in quantities sufficient to be observed readily and noted with appropriate apparatus, then will consist of gas, escaping from formations down the hole, and mixing thoroughly with the mud during its upward passage.

Due to the expansive qualities of the gas, it will tend to arrive at the surface slightly ahead of the heavier cuttings which identify the formation from which the contamination is taking place. This differential between initial gas and cuttings showing in the mud stream falls within the limits of error in computation of actual travel time for the mud from bit to surface, and may be disregarded in checking markers against drill-pipe measurement.

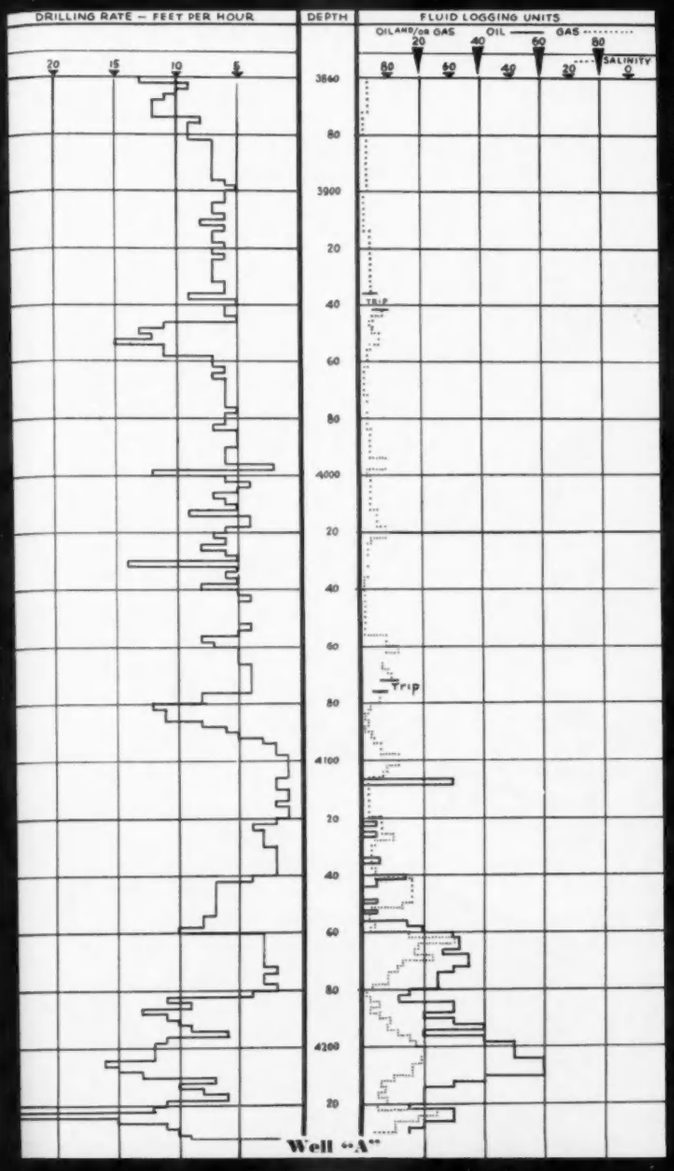
Theoretical concentration in the drilling mud of fluids (oils and/or gas) picked up by the mud during drilling, assuming no flushing ahead of the bit, is cited by Hayward[2] with the following assumed data:

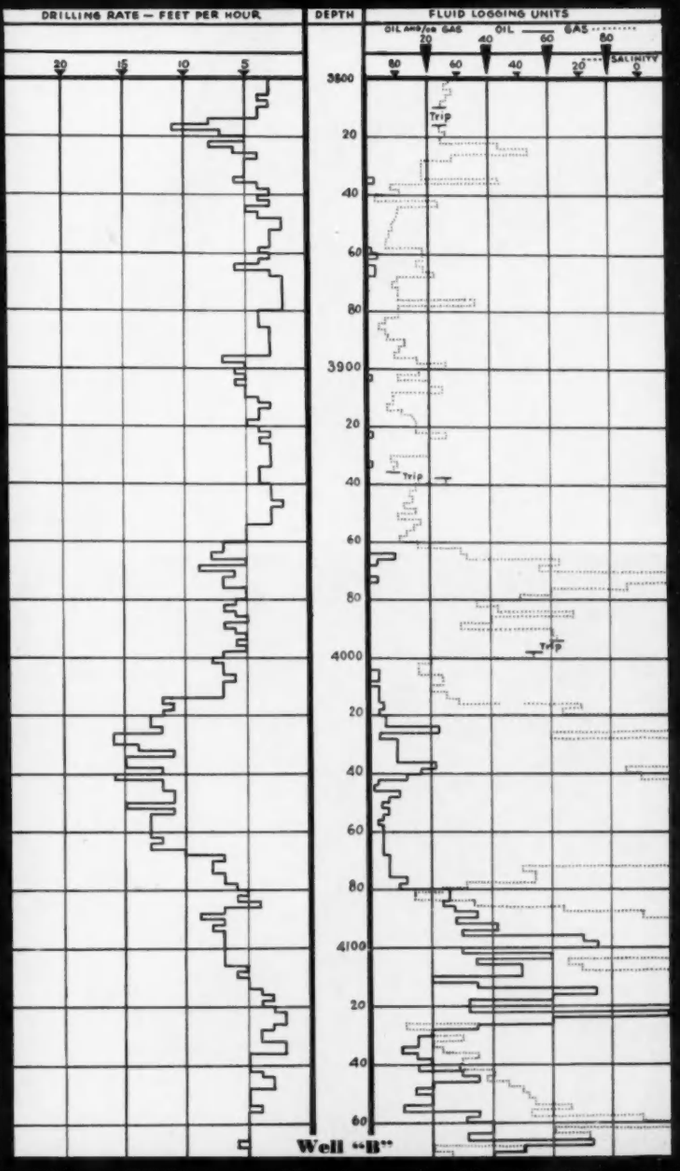
Depth of well	6,000 feet
Rate of circulation	800 barrels/hour
Diameter of hole	9 inches
Porosity	25 percent
Rock pressure	200 atmospheres

Each lineal foot of rock drilled in this 9-inch hole contains 735 cubic inches, of which 184 cubic inches will be pore space. If the pores contain an incompressible fluid and the drilling rate is 1 foot per hour, the fluid (assuming total amount present in formation is liberated and added to drilling fluid) would be transported to the surface in the mud stream at the rate of 184 cubic inches per hour, or



Gas detector of the compression type, in which a standard volume of mud is subjected to pressure which compresses gas content and permits direct reading of gas from calibrated plunger.



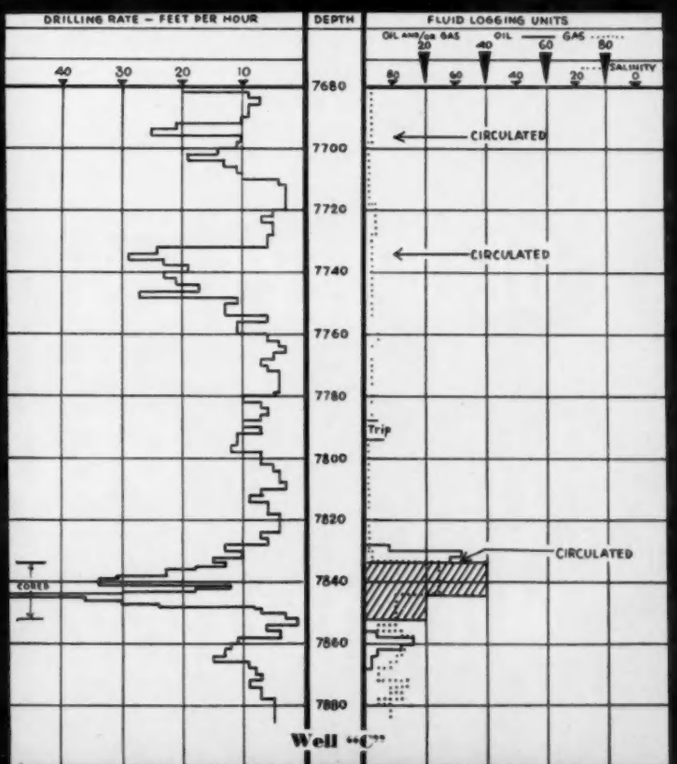


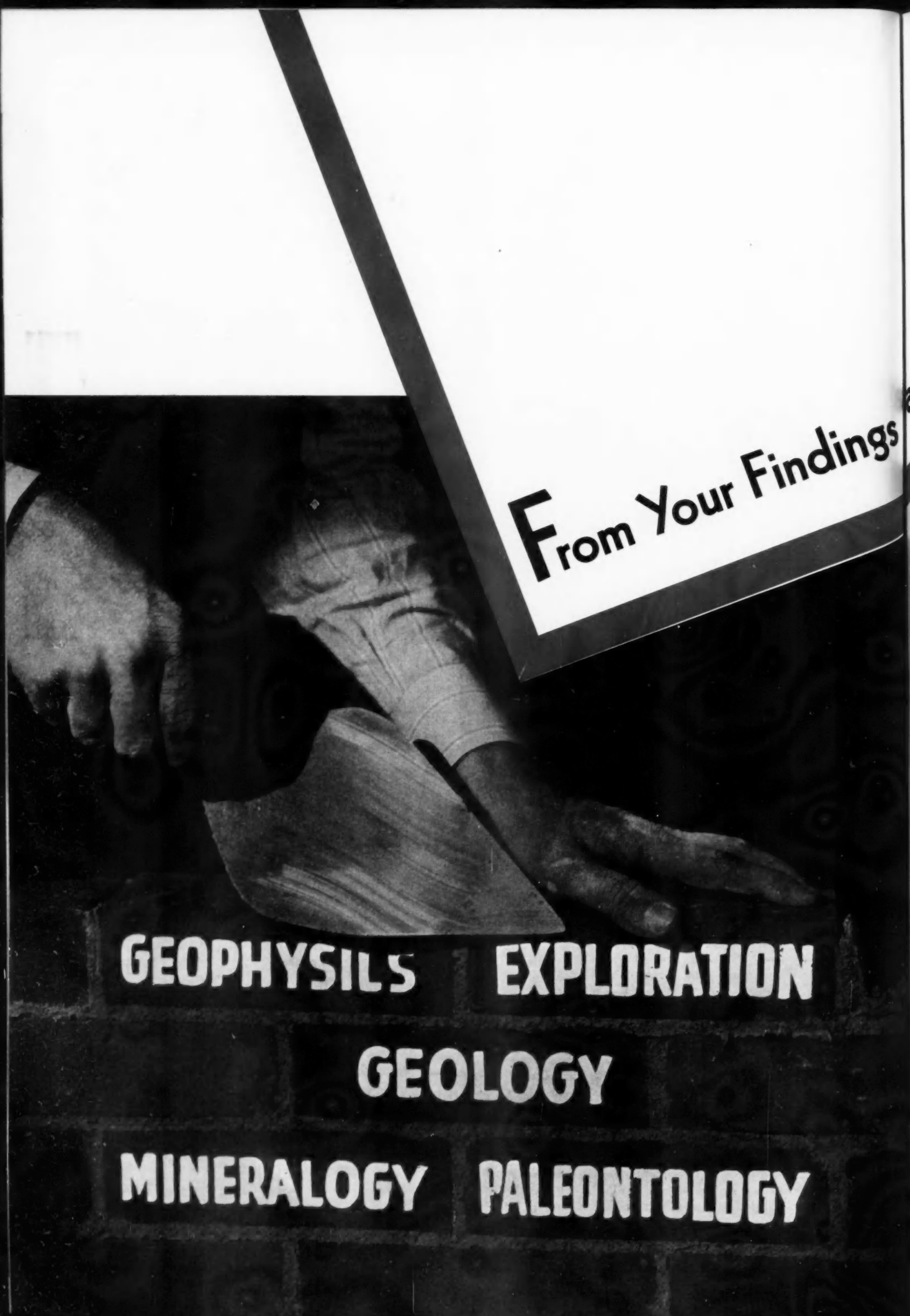
Typical Mud Analysis Logs

Logs obtained by mud analysis in the Goldsmith field, West Texas, are shown for two wells, "A" and "B". In Well "A" the top of the producing section is at 4140 feet, and the gas-oil contact at 4156 feet. Above the top of the formation smaller gas shows were picked up. In this well casing was set at 4175 feet, 19 feet below the gas-oil contact, and the well completed below that depth. Gas indications appear practically throughout the oil section. A potential test, showing gas-oil ratio of 1076/1 confirms this log indication.

In Well "B" the top of the producing horizon was indicated at 3966 feet, where a large gas increase is logged. Gas-oil contact appears at 4090 feet. Below this depth relatively larger amounts of gas occurred in the oil-saturated section. The well was completed below 4105 feet with gas-oil ratio of 1480/1.

Well "C" is from an Oklahoma wildcat, and shows the frequency with which circulation was maintained to afford mud-analysis checks on gas and oil shows. Only five cores were taken, although over 50 drilling suspensions were made to check returns when drilling breaks occurred.




From Your Findings
GEOPHYSILS EXPLORATION
GEOLOGY
MINERALOGY PALEONTOLOGY

are Laid the Foundation of an Industry

FRICK-REID

. . . . extends greetings and best wishes to three groups of technical men whose achievements are of vital and growing importance to the petroleum industry:

Society of Exploration Geophysicists

American Association of Petroleum Geologists

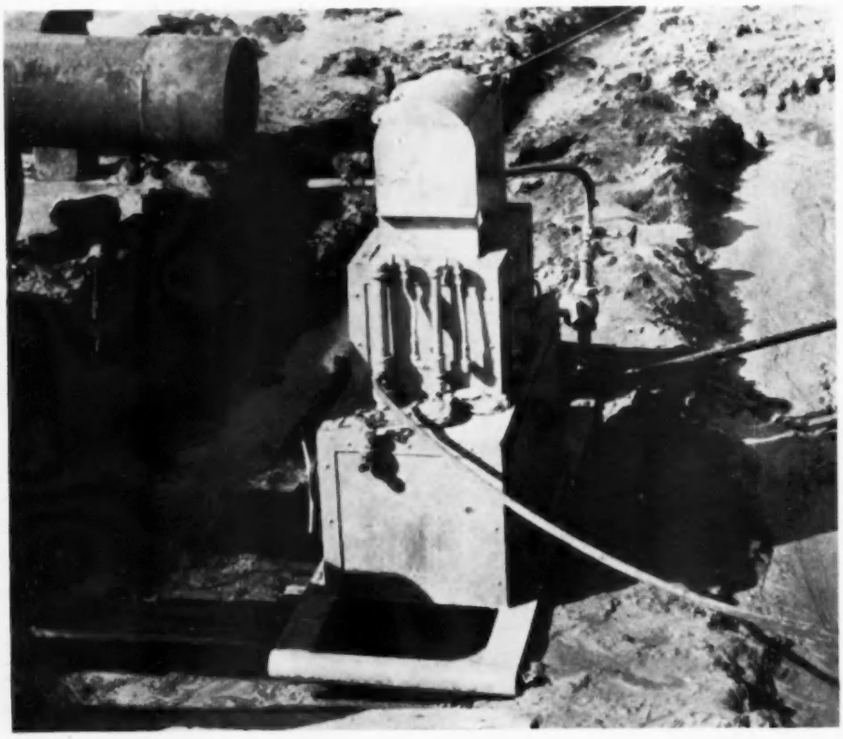
Society of Economic Paleontologists and Mineralogists

. . . . ASSEMBLED THIS WEEK AT
HOUSTON, TEXAS
. . . . IN ANNUAL CONVENTION

"... here's MY warehouse!"

FRICK-REID *Supply Corporation*

TULSA, OKLAHOMA



Portable filament-type gas detector mounted adjacent to mud ditch, with insulated cable permitting mounting of indicating instrument on drilling flow in sight of driller.

at a concentration of 24 parts per million.

If, in place of this incompressible liquid, the pores are filled with a perfect gas, when measured under surface conditions (assuming uniform temperatures throughout) the gas would be brought to the surface at a rate of 21.3 cubic feet per hour. Expressed in relation to volume of drilling fluid flowed during the time, the gas represents one volume in 200, or 0.5 percent.

Since fluid-bearing formations are rarely drilled at a rate as slow as one foot per hour, quantities of oil or gas greatly in excess of those chosen for illustrative purposes are available for analysis or test, with the sensitivity of the instruments required for detection being inversely proportional to the speed of penetration.

Determining Return Flow Time

Actual rate of penetration of the formation, as indicated by kelly measurements, varies over a wide range with different bits, condition of bit, and kinds of formation being drilled. Reliance upon bit penetration speed alone gives but an indefinite measure of time for returns to reach the surface. Hayward[2] discusses fully the behavior of drilling fluids, and their lack of reliability as measure of time elapsed between release of oil or gas and their appearance at the surface.

Attempts to work from a time interval based solely upon nominal diameter of the hole, pipe bore, and computed annulus available for returns, with an assumed rate of circulation, gives results which vary widely from those determined experimentally through the use of "telltales" placed in the pipe when adding a joint. Use of meters in the mud ditch, while serving to check against loss of fluid into the formation, also fail to give the desired information regarding oil and gas release and appearance at the surface.

The method most generally used employs the mud pump as a meter. No actual calculation of amount of fluid pumped to complete a cycle from kelly to bit to ditch is necessary, only the actual number of pump strokes to effect a visible return of the "telltale" to the screen being required. If this factor be checked occasionally, and a correction factor applied to allow for the time required for carrying fluid from the floor to the bit, the time for travel through the mud from bit to ditch becomes

$$s_r = s_t - s_p$$

Where s_t is the total number of strokes for a "telltale" cycle, s_p the number of pump strokes required to fill the drill stem at a given depth, and s_r is then the desired measure of return time, expressed in terms of strokes of the mud pump.

Gas Detection

In the detection of gas, with one type of instrument now available for determining its presence in the mud returns, the mud is passed through a separator trap and a vacuum maintained to draw off any vapor obtained. The vapor is transmitted to a combustion type of gas detector in which is maintained a hot wire filament, coupled in a balanced bridge circuit.

Since the filament, when heated by electricity, has under normal conditions a definite electrical resistance, any change in the surroundings of the filament which affects its temperature affects the rate of current flow through the filament, and also through the bridge circuit. When even a minute quantity of gas reaches the gas detector the temperature of the filament is increased by combustion of the gas, thus increasing its resistance. The unbalanced flow through the bridge, directly related to the resistance change in the filament, is a direct indication of the amount of gas present.

The relative amount of gas in percentage or volume, as desired, is shown by an electric meter which, calibrated in percentage, indicates directly the amount of gas present. A continuous record of this change also is obtained through a pen which traces on a strip chart the indications of gas volumes as shown on the visible scale.

Since the lower limit of gas sensitivity which such an instrument can detect and record is 0.25 percent of the amount of gas present in the chamber surrounding the filament, ample provision for gas detection is afforded. The gas required to make a change in the current reading is so slight that it will be recorded on the chart before any change is evident in mud weight or viscosity, and before the dispersion of minute gas bubbles in the drilling fluid is visible to the eye.

The filament is sensitive only to temperature changes and must be actuated by the addition of an inflamable gas to the vapors normally surrounding it; but, inasmuch as occurrence of other than hydrocarbon (and thus combustible) gases is rare in oil-well drilling, the detector may be relied upon to note and measure gases as liberated from the formation by the drill.

An instrument also is available

a PIONEER in Sound Technique

In 1934 **S S C** introduced a method of continuous profiling, to determine structures in the Gulf Coast Area.

In 1935 **S S C** by its method of continuous profiling discovered and mapped a faulted structure, with dips of fifty feet to the mile, which subsequently was proved to be one of the largest oil reserves in the Gulf Coast.

Now, six years later, the accepted technique for the determination of low dip structures and fault problems in the Gulf Coast is the continuous profiling method.

S S C is still pioneering

In addition to the **S S C** standard continuous profiling method, we now offer the skip-spread continuous profiling method which permits the highest order of accuracy at the lowest cost.

S S C crews are always available for any type of seismic exploration anywhere in the world.

World Wide Experience

WICHITA, KANS. FLORA, ILL. HOUSTON, TEXAS MARACAY, VENEZUELA

Seismograph Service Corporation

CONSULTING EXPLORATION GEOPHYSICISTS

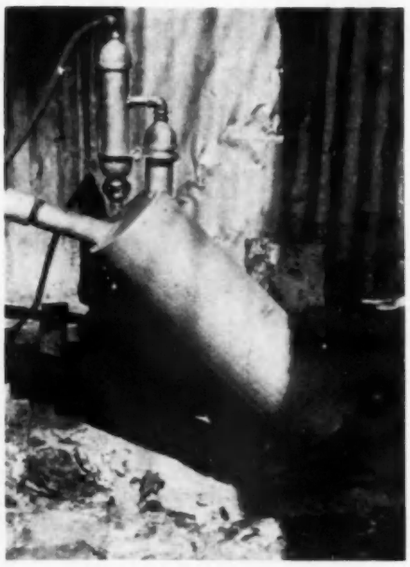
KENNEDY BUILDING

TULSA, OKLAHOMA, U. S. A.

for use with gas detectors of the filament type, in which a known volume of drilling mud is trapped and subjected to a given increment of pressure. Since the drilling fluid is non-compressible, the reduction of volume must take place in the gases carried in the mud, the gas volume being measured by calibrating the plunger or reading direct from the scale.

The volume is considered as being composed of a volume of non-compressible fluid and a volume of compressible gas. The initial pressure is atmospheric. By advancing the calibrated plunger through the packing gland and into the chamber, the pressure within is increased. Since the detremination may be made in a few seconds, temperature changes are negligible and remain at the equilibrium established by continuous mud flow through the instrument until a determination is begun.

Since the volume of the cylinder is constant, if the pressure ratio be held constant, the percent gas is in direct proportion to the volume of the plunger which enters the chamber. Thus direct readings are obtainable and no calculations need be made.



Mud-gas separator with counter flow to maintain desired head on device and prevent the entry of outside air. Trap in outflow line provides additional separation of gas from fluid or mud particles.

Fluoroscope with constant volume sampling containers arranged for derrick-floor determination of oil content in drilling fluid.

This type of instrument is applicable either for intermittent determinations, or for periodic checking of the continuous devices.

Fluoroscopic Oil Detection

When the presence of gas is indicated by the gas detector, a check on the mud returns for possible oil content is possible by means of the fluoroscope. Minute quantities of oil, of the order released when penetrating 1 foot of saturated formation per hour with 25-percent porosity, are invisible to the eye and do not alter the mud as to viscosity or weight within the scope of instruments normally used for these determinations. Such diffusions, however, may be determined by a fluoroscope, utilizing a light ray functioning in a band of from 2,000 to 4,250 Angstrom units, or from the lower limits of violet in the visible spectrum through the range of ultra-violet emanations. Radiations below 3100 Angstrom units are especially useful in determining oil in drilling mud.

The examination of mud for oil is not continuous, as is the gas sampling, but requires the examination of a specific sample of mud under the light, with either chemical or mechanical treatment to aid the separation of the oil and its flotation to the surface of the sample.

Radiation striking these bubbles, dispersed on the surface of the mud samples, is reflected and converted to visible light in the fluoroscope, quantitative amounts of fluorescence being determined relative to the amount of oil in each sample, when using uniform-sized samples for all determinations.

For normal determinations of oil arbitrary figures of one to five are sometimes used in grading fluorescence values in mud samples. When this scale is employed, values are as follows: (1) trace; (2) show; (3) fair; (4) good; and (5) excellent. In the upper values the amount of oil carried by the stream of mud is sufficient to permit quantitative determination by ordinary laboratory technique.

A fluoroscope to be fixed over the mud ditch, and which may be used to inspect the entire mud stream, is now under test, and should reduce the examination for oil to fluorescent observation of the oil globules as they pass below the base of the inspecting device.

[1] Brad Mills, "Continuous Determination of Oil and Gas Content of Drilling Mud Helpful," The Oil Weekly, Aug. 1, 1938.

[2] J. T. Hayward, "Continuous Logging at Rotary Drilling Wells," paper before the Division of Production, American Petroleum Institute, annual meeting, November 11-15, 1940.

—Photo Arts Photograph

Core Analysis Presents Inclusive Formation Data

TECHNIQUE of core analysis, with an ever-widening background of experience, is being improved constantly. Today, a core is a true sample of that section of the formation from which it is taken, if accurately obtained, and may be made to afford the geologist as well as the petroleum engineer data upon which to predicate not only initial production rates but also ultimate returns and the economics of secondary recovery methods.

Core analyses from a sufficient number of wells given proper coring procedure and adequate laboratory technique, may be relied upon by the geologist to afford him data on liquid saturations, which include the amount of pore space occupied by oil and water; permeability, which is an absolute measurement of the rate of fluid flow; porosity, which is the percentage of formation volume available for oil, gas and water. Amplification of saturation data furnishes the characteristics and physical properties of the oil available.

Given proper supervision, core recovery percentages will run sufficiently high to present necessary geological data and enable representative analyses to be made. In 1940, out of 54,789 feet of hole cored by a number of operators and appearing in the records of one laboratory firm, 40,718 feet of core were recovered, or 74.7 percent recovery. These results were obtained with wire line, conventional and pressure-type core barrels, in all diameters. The percentage of core recovery appears directly as a function of the service, attention and interest which the cores received from the operator.

To yield best results in the core laboratory, the cores should be of as large diameter as compatible with drilling practice at the well where they are secured. They should be subjected to a minimum of flushing with the mud stream, or if cut "dry" should be drilled out at such a rate as to preserve within them the maximum percentages of oil, gas and connate water, so as to present at the surface as close a reproduction of the reservoir *in situ* as possible. Lest any of the *in situ* characteristics be lost or altered, such cores should be examined and analyzed as promptly upon being brought to the surface.

Analyses from adjacent core samples, a portion checked with adequate apparatus at the derrick and others packed with utmost care, including waxing or paraffin-coating to prevent evaporation, and then analyzed at distant laboratories, show that the more representative and come commercially significant values of all desired factors may be secured by immediate analysis. Such prompt determinations present a more representative picture of true reservoir conditions. Derrick-floor analyses, made promptly, also enable drilling changes to be made even within limits of comparatively thin strata while the bit is still in the formation being cored.

From the foregoing data together with the determination of the gravity of the oil in the cores, calculations can be made which furnish reliable indications as to the amounts of interstitial or con-

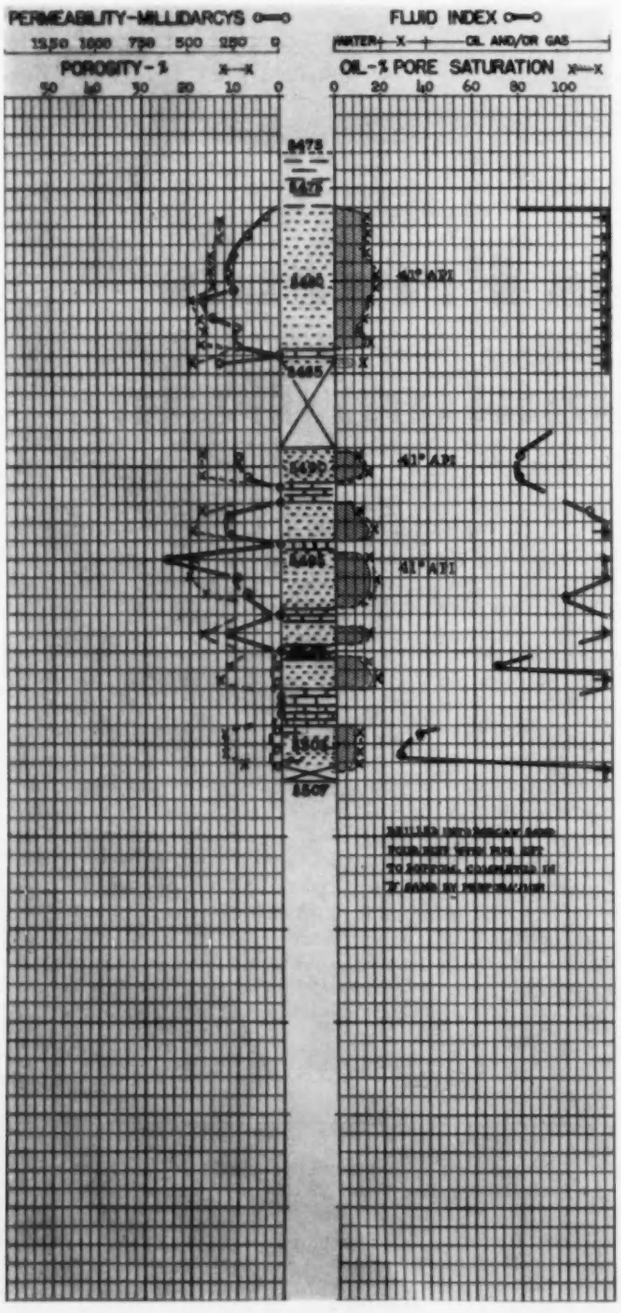
nate water in place, the amount of oil and dissolved gas in place, the productivity index, where oil productive, the open flow potential where gas productive, shrinkage expressed in the term "formation volume factor," recoverable oil and gas.

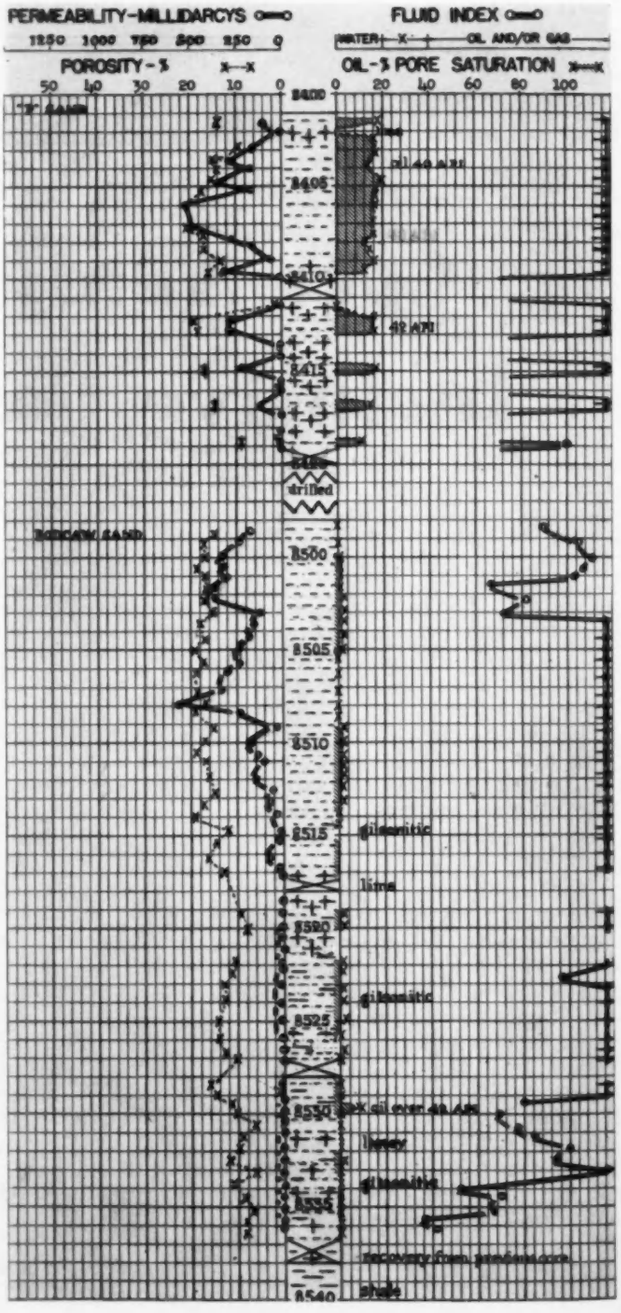
Cumulative data from thousands of core analyses in various formations indicate that different sands have different tolerances for connate water, and that when this tolerance is exceeded by the amount of water which may be held interstitially by the sand production, even though oil be present, will be water. One laboratory delineates the presence of a water-bearing sand by an index empirically determined from analysis data and graphically plotted on the coregraph.

Connate water, as determined by core analysis, may be determined and differentiated from drilling-mud contamination; this relation having been checked experimentally on cores obtained with normal—mud flushed—coring as compared with cores from adjacent wells cut dry, with oil as cutting fluid and when using tracers in the drilling fluid.

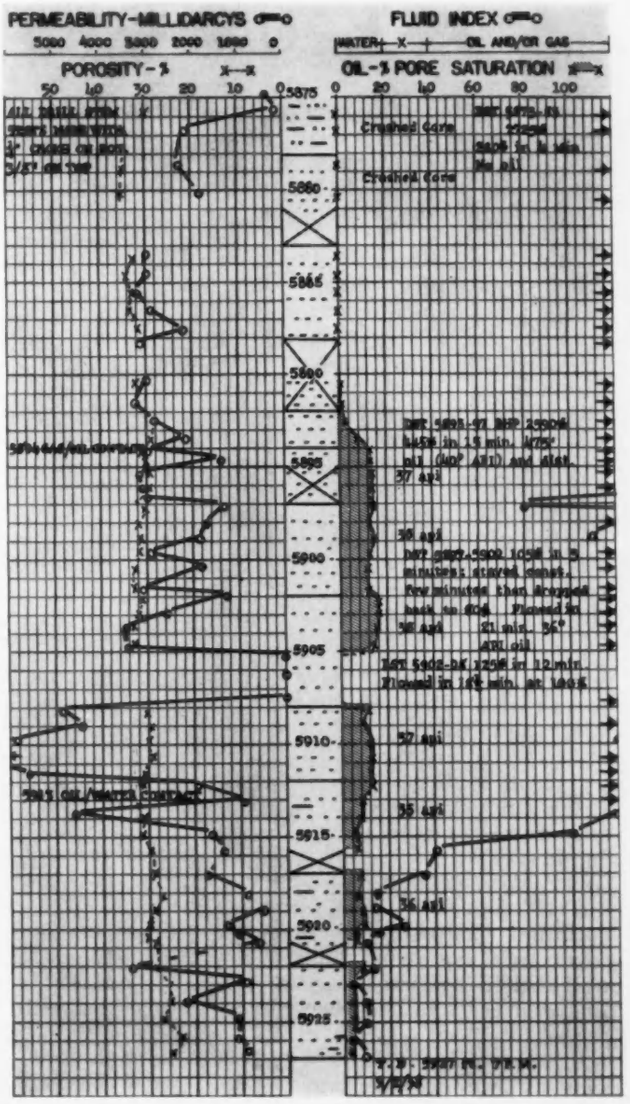
Discussing core analysis as a means for ascertaining reservoir characteristics, Wyckoff[1] says "careful coring and complete core analysis appear to be essential for any intelligent development. Experience seems to indicate that it is a profitable procedure, even if used only as a guide in completing wells, not to mention the value of the data at a later date in planning development and operating procedure.

"It might seem that the process of direct sampling of the reservoir by coring and subsequent careful analysis provides an immediate solution not only to questions regarding porosity, permeability and other physical properties, but to





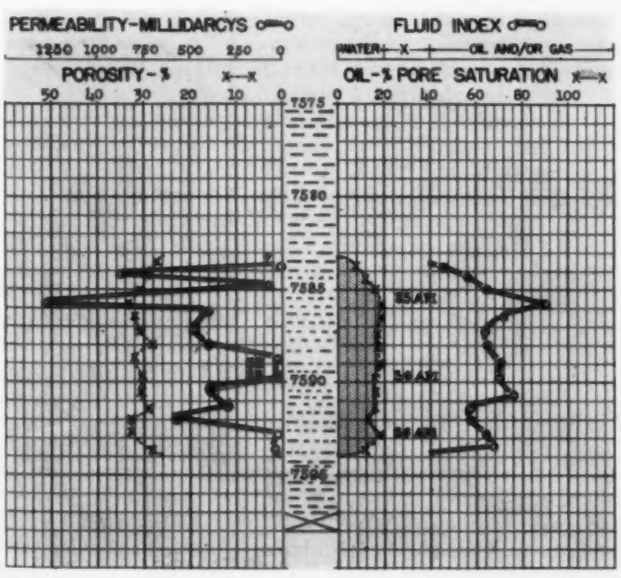
The coregraph at left on opposite page shows highly productive oil sand, while that on the right (opposite page) shows an oil productive sand of lesser ability to produce and one in which the critical rate of production will be less than the one on the left because of a lower capacity (permeability times thickness). Both wells, belonging to Oliphant Oil Corporation in the Cotton Valley field, were completed as oil wells. The right-hand graph shows no water throughout the section cored and shows a consistent presence of traceable condensate. The permeability profile, however, shows that practically no production nor gas intake—if used in cycling—could be expected to result from exposure of the bottom 25 feet. Possibility of approach to oil contact is indicated by increase in saturation at 8529.5. Slightly further down dip the Bodcaw sand is oil productive.

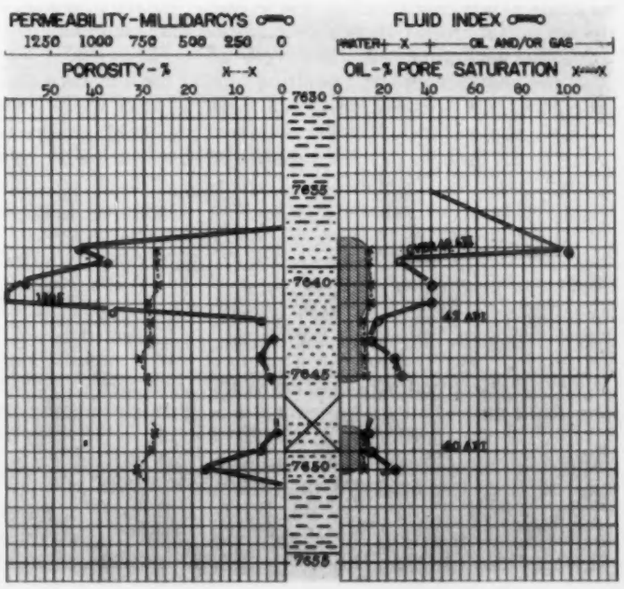


At upper right this page appears a coregraph of Coronado's Rooke 1, La Rosa field, which shows the application of field core analyses to exploitation and evaluation in a discovery well. The graph shows gas-oil and oil-water contacts, which were confirmed by four successful drill stem tests.

The coregraphs below, taken on Woodley Petroleum Company's wells in the Hardin field, show the difference between a good oil well and a non-commercial well. The coregraph directly below shows a good oil sand. The one at right below shows a low fluid index, and the well made 90 percent water on production tests and was abandoned.

—Coregraphs courtesy Core Laboratories, Inc.





questions regarding fluid content of the pay *in situ*. In regard to the physical properties the information is ascertained directly and adequately. In practice the original fluid contents are inferred by suitable statistical information, coupled with the knowledge of the residual fluids observed in the core sample.

With such factors as porosity and permeability directly determined, and connate water determinable from observation and comparison with earlier known results, methods of secondary recovery through repressuring, cycling water-flooding and other means may be evaluated during the development of a field, and drilling planned to afford the required number of properly spaced secondary recovery wells correctly located among those participating in the initial production life of the field.

Practical Value of Analyses

An early application of core analyses was in working with the shallow sands of Illinois, such as the Cypress and the Bethel. Analyses of a moderate number of scattered and representative wells secured ample valuation and primary recovery data. But, as production at the 1400-foot depth falls within the optimum range for secondary recovery in some form, almost every well drilled by one company was analyzed early in the development period.

In this work a third use of core analysis was for the purpose of aiding in proper evaluation of wildcats, edge and extension attempts.

When cores could be analyzed within a few hours after recovery, it was soon found possible to predict performance of the well in Cypress or Bethel sands with great accuracy. In some cases core analysis gave reliable predictions on whether production would be water or oil. Satisfactory drill-stem tests were difficult to obtain in these shallow sands of fairly low permeability, (75 M.D. to 125 M.D. averages in one field, and 150 M.D. to 200 M.D. averages in most parts of the other field), and with the low pressure difference available to flush mud cake from the sand face and give some positive evidence in the drill stem.

The above three reasons having caused the core analysis of almost every well drilled, other more immediate uses were developed in these fields. One of these was selective shooting, the placing of heaviest shots, (that is, the greatest number of quarts of nitroglycerin per foot), in the least permeable parts of the section—the purpose, of course, being to obtain an exposed sand section with permeability as near equal at all points, (depths) as possible.

A very unusual, and valuable, use developed in the town-lot development of one Illinois shallow field. The usual size individual pumping unit was not large enough to pump the early production of many of these wells, this immediate area having an average permeability from 2 to 5 times greater than the major portion of the field.

A number of wells were considerably larger than the capacity of the standard pump unit, but most were only a little larger than usual pump capacity. Moreover, with close drilling, wide open production, and the cut-throat race against time situation, all wells with even a few nearby offsets declined very fast during the first 5 to 10 days on production.

The next larger size individual pumping unit cost about $1000 more to install. This total installed cost was about 2½ times that for the standard unit, and the large unit cost much more to operate than the smaller unit when pumping moderate volumes after the flush stages.

A preliminary pumping test to determine size of the well wasted valuable time. To save this time, with the aid of core analysis the productivity index for each well was calculated. Then with bottom-hole pressures estimated from static fluid level measurements in nearby wells, the initial and early production for the well was calculated. Calculated production both before and after shooting with nitro were checked closely by the actual production. The check was remarkably close in many instances considering the rough nature of the bottom-hole pressure measurements available under the circumstances.

With calculated initial production data at hand it was possible to decide whether the size of the well would pay for the extra size unit, or whether 4 or 5 days pumping would find the small unit capable of lifting the maximum output of the well.

With this calculated initial production in hand even before casing had been run in the well, it was possible to have the optimum size unit installed and ready by the time well was ready to produce.

Sometimes the combination of size of the well as calculated from core analyses, offsetting situation, etc., was such that it was advisable to put the well on production without shooting and cleaning out, as these two operations consumed about 4 days even when hastened as much as possible, and as the time element was very important, especially in certain "hot spots."

Subsequent developments indicated that the planned procedure, using core analysis as guide to operations, resulted in substantial savings over the production obtained in the less orderly scheme generally adopted in town-lot operation.

Comprehensiveness of Analyses

Besides determining the proper completion, shooting, pump size and location and other problems important at the time of drilling and bringing in a well, core analyses also present data with which the fundamental drainage and reserve-estimate calculations may be evaluated. Through them estimates of relative depletion pertinent to the drainage-radius of a given well may be made with confidence that the analyses represent a true sample of the reservoir within those boundaries — assuming, of course, homogeneity of the formation and absence of faults and other breaks.

Calculations of Ultimate Yield

Oil reserves may be determined by[3] "(a) the old method of decline curves, or (b) by multiplying together a number of factors which have been individually studied and measured with care, or (c) by detailed analysis of production history, including data on gas-oil ratios, bottom-hole pressures, etc., and the projection of this history into the future."

Proration so extends the significant changes required for factors (a) and (c) that necessary data for accurate determination may not be available until far in the future, leaving (b) as the only method available for determination of reserves by the proven-area method.

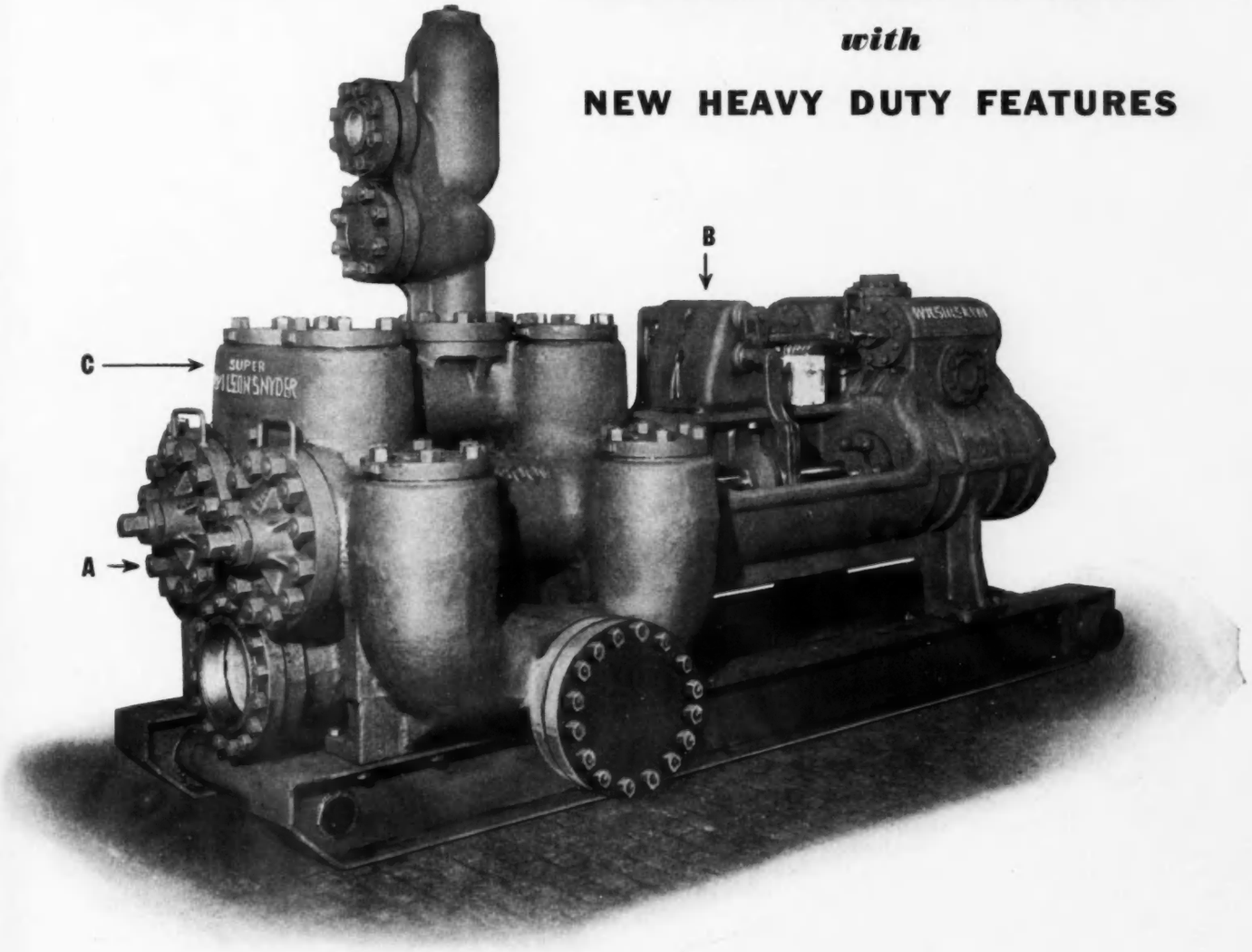
Knowing the factors in (b), the amount of oil recoverable under ideal conditions may be expressed as shown in Table 1. Type of drive and relative effectiveness of the drive, whether gas-expansion or water-drive, is discussed fully by Schilthuis[3] and Johnston.[5]

Calculations of recoverable oil

The SUPER WILSON-SNYDER STEAM SLUSH PUMP

with

NEW HEAVY DUTY FEATURES



LINER SPACER AND HOLDING DEVICE

A—Heavy duty design and construction. Spacer contacts liner over entire collar width. Extra heavy large diameter adjusting screw. Screw operates through cast steel cylinder head. End of screw turns against a heavy duty roller bearing.

ROLLER BEARING EQUIPPED VALVE MOTION

B—Compact and rugged—grease lubricated and weather proof. All shafts, clevises, and rollers operate on roller bearings. Sealed against dirt, grit, and water. Seals arranged to permit grease to lubricate ends of cranks. Alemite fittings for applying grease.

C—This pump can be furnished with either cast steel or semi-steel fluid end.

Wilson-Snyder Pumps Sold Exclusively on the Gulf Coast by

WILSON SUPPLY CO.

1412 MAURY ST. HOUSTON, TEXAS

EXCLUSIVE GULF COAST DISTRIBUTORS FOR:

Wilson-Snyder Pumps; American Cable Tru-Lay Preformed Wire Rope; Kewanee Boilers; Drift Meter, Jr.; Gray Swivel; Nixon Surface Control Gas Lift; Nixon True-Taper Slip and Spider; Bowen Pack-Off and Releasing Drill Pipe Overshot; Douglas Weight Indicator; Coffey Robot Stack Draft.

OIL & GAS WELL SUPPLIES

Complete line of

Fishing Tools and Service

BRANCH STORES:

TEXAS: Gladewater; Barbers Hill; Bay City; Monahans; Alice; Victoria; Corpus Christi.
LOUISIANA: Rodessa; Lake Charles; New Iberia; Gretna; Shreveport.
ARKANSAS: Magnolia.
NEW MEXICO: Hobbs.
SALES OFFICES: Tulsa, Okla.; Dallas, Texas.
LOS ANGELES: 1341 South Hope St., Phone Richmond 9121.
TRINIDAD, B. W. I.: Neal Massey Engineering Corp.

TABLE 1

Sample Oil Recovery Calculations from Hypothetical Core Analysis Data

By Effective Water Drive	Percent of Pore Space	Bbls. per Acre Foot
Total average porosity, 28%	100.0	2173
Less calculated connate water	35.0	760
Equals total volume available for storage of oil and gas	65.0	1413
Less residual or final oil saturation after effective water flood (corrected for shrinkage)	17.3	376
Equals total volume of pore space filled by recoverable oil and gas	47.7	1037
Correcting for shrinkage of produced oil (Divide recoverable oil and gas by 1.33)	35.8	778

Net recoverable oil in barrels by complete effective water drive and without excessive drop in bottom-hole pressure is calculated to be 35.8 percent of the pore space or 778 barrels per acre foot.

By Natural Production (or Gas Expansion)	Percent of Pore Space	Bbls. per Acre Foot
Total average porosity, 28%	100.0	2173
Less calculated connate water	35.0	760
Equals total volume available for storage of oil and gas	65.0	1413
Less residual or final oil saturation after natural production	45.0	978
Equals total volume of pore space filled by recoverable oil and gas	20.0	435
Correcting for shrinkage of produced oil (Divide recoverable oil and gas by 1.33)	15.0	327

Net recoverable oil in barrels per acre-foot by natural or gas-expansion production is calculated to be 15.0 percent of the pore space or 327 barrels per acre-foot. This figure refers to the yield to be obtained under ideal conditions, with adequate dissolved gas and upon reduction of bottom-hole pressure to atmospheric.

content, later proved by production records, have ranged from less than 100 barrels per acre-foot to over 1400 barrels per acre-foot, depending upon porosity, shrinkage, residual oil content, viscosity of oil and other measurable factors.

Complete solution of the problem of calculating recoverable oil involves the use of variables dependent upon well-spacing, regional drainage, and upon variations in the economic limit of production rate. The economic limit of water-drive production is affected by the water-oil ratio which in turn is controlled to a large extent by the regularity of the permeability profile and by the viscosity and pressure of the subsurface fluid. Production economics likewise terminates the expulsive action of dissolved gases in forcing recoverable oil from the pores of the formation to the well bore. With adequate information regarding the formation available, evaluation of these variables may be made within engineering limits and well- and field-performance forecast.

Gas Cycling and Water Flooding

If, from the data assembled by core analyses during drilling of a field, there appears to be sufficient residual oil in the reservoir at the end of natural flow to permit additional output through cycling gas, this process becomes a secondary recovery project. Discussing this problem, Muskat[4] states "If there does appear to be enough residual oil to warrant cycling operations, the manner of completing both the injection and oil wells should be guided by the core analyses or electric-log data gathered. For example, it may be assumed that zones of high permeability will have been depleted more highly than those of low permeability. The former are those through which injected gas is most likely to channel. Clearly, attempts should be made to seal off these strata.

"If water-flooding operations appear to be practicable, use here, too, may be made of core analysis data in guiding the details of completion of both the injection and output wells with respect to shutting off by-passing channels. Moreover, these data will make possible the calculation of injection rates as a function of the surface pressure and thus assist in the choice of injection equipment and in planning the program."

Discussing the economic factors affecting gas-distillate field exploitation, Emby Kaye says[7] "The considerations affecting the estimating of distillate reserves in place are in the main subject to the same errors as are involved in determining dry-gas reserves. Determinable data include acreage, sand thickness, reservoir pressure, reservoir temperature, porosity and connate water provide the basis for calculating the volume of gas in place."

By means of proper interpretation of complete core analyses, continuous as far as core recovery may permit, conservation of initial gas-or water-drive may be aided by completion methods which provide for the sealing off of zones which offer, through inherent characteristics, channels for loss of original reservoir energy without commensurate recovery.

Core analysis offers the geologist not only indentification of the formation, more or less accurately recognized from cuttings carried by the mud stream, but also definite data on the fluid content of the various strata—information which is destroyed or seriously altered in ordinary drilling operations. Properly carried out these analyses permit determination of static and dynamic conditions within the formation, enabling an economic relation to be established between these factors during productive life of the well. They also, by providing initial data on a field as it is developed, afford direct means of comparison with cores taken during subsequent drilling carried out to determine the amount of fluid left in a reservoir which has been depleted in so far as natural flow is concerned, and justify or condemn secondary recovery projects. The decision must be made with precision. The geologist's approach to the problem can be only as accurate as the factual data with which he is provided. Coring followed by complete analyses made as promptly as possible has proved to be essential to efficient and satisfactory professional exploitation of oil fields.

[1] R. D. Wyckoff, "Factors Affecting Reservoir Performance," presented at annual meeting of A.P.I., Chicago, November, 1940.

[2] Frederic H. Lahee, "This Matter of Estimating Oil Reserves," January, 1941, Bulletin of the A.A.P.G.

[3] Ralph J. Schilthuis, "Active Oil and Reservoir Energy," Vol. 118, Trans. A.I.M.M.E.

[4] M. Muskat, "Determination of Factors Affecting Reservoir Performance," presented at annual meeting of A.P.I., Chicago, November, 1940, and printed in full in The Oil Weekly, January 13, 1941.

[5] Norris Johnston, "Core Analysis Interpretation," presented before the Pacific Coast District of the A.P.I. March 11, and to be read at the Mid-year meeting of the A.P.I. in Tulsa, May 19-23.

[6] T. V. Moore, "A Review of Oil-reservoir Performance," before Mid-year meeting of the A.P.I. in Fort Worth, May, 1940.

[7] Emby Kaye, "Some Factors in the Economics of Recycling," T.P. 1304, A.I.M.M.E.

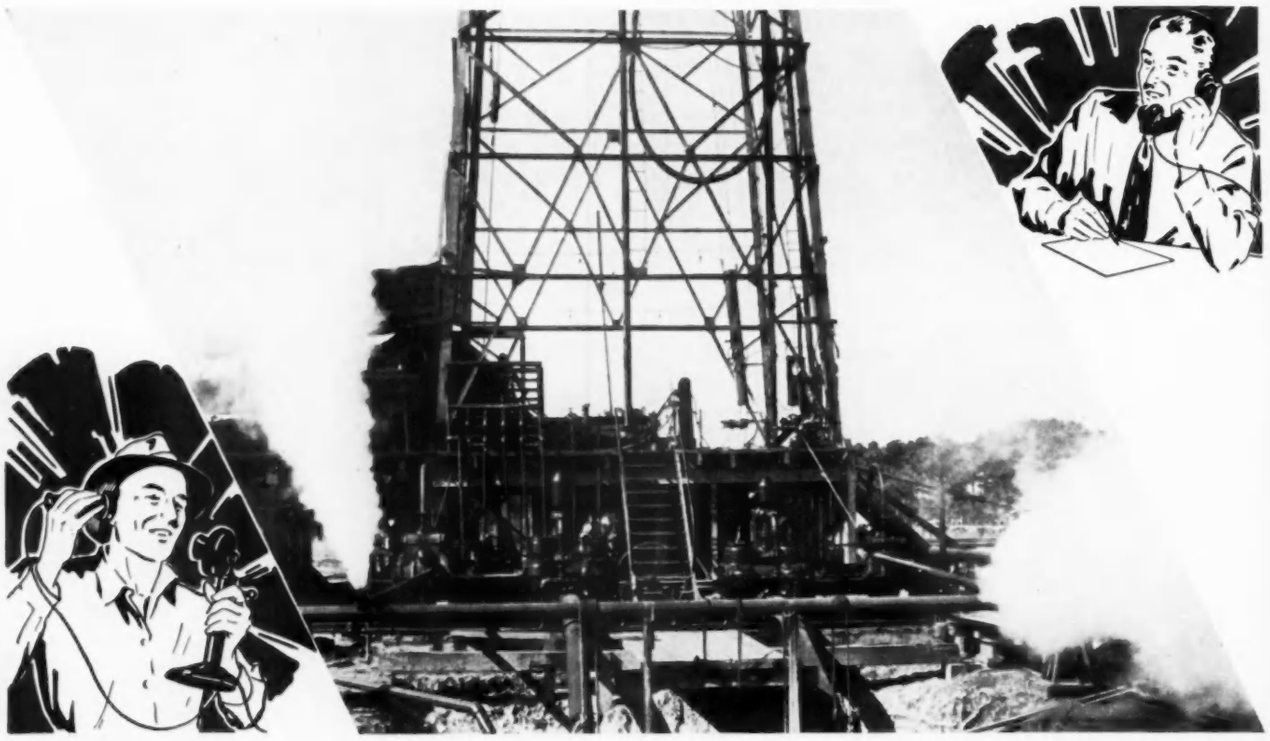
RESEARCH

Look to Schlumberger for improvements in Electrical Well Logging, Precision Gun Perforating, Side Wall Sampling and Directional Surveys.

Schlumberger engineers are constantly searching for more efficient oil producing methods.

PHOTOGRAPH BY ROBERT YARNALL RICHIE

SCHLUMBERGER WELL SURVEYING CORP. • HOUSTON, TEXAS



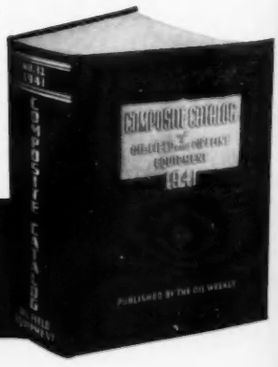
Delay takes a holiday...

There is no "time out" in oil field and pipe line operations. They are continuous; seven days a week, twenty-four hours a day. Speed is a prime essential. Delay in securing equipment can be costly and delay in securing information on equipment can be costly too.

Delay takes a holiday when The Composite Catalog is on the job. There are very few questions which arise concerning equipment or services that cannot be quickly answered by consulting a current edition of The Composite Catalog. Within its covers are the complete or condensed catalogs of most leading manufacturers of oil country equipment. Its more than 2200 pages of actual catalog data constitute a veritable library of the latest equipment information.

The classified index, in accordance with your suggestions of the past, is arranged in alphabetical order and shows the actual page numbers on which products are described. SAVE TIME — Speed up your orders by referring to the item by page number in The Composite Catalog.

RELIABLE · MORE COMPLETE
UP TO DATE · CONVENIENT



the COMPOSITE CATALOG

OF OIL FIELD AND PIPE LINE EQUIPMENT

Estimated Proved Petroleum Reserves in the United States
(Barrels of 42 gallons)

STATE	Proved Reserves as of January 1, 1940	Proved Reserves Discovered and Developed in 1940	Production During 1940 (B. of M. Preliminary)	Proved Reserves as of January 1, 1941 (Col. 1+2 less 3)
	(1)	(2)	(3)	(4)
Arkansas	320,148,000	11,653,000	25,583,000	306,218,000
California	3,532,342,000	17,079,000†	223,881,000	3,291,382,000
Colorado	20,162,000	4,411,000	1,350,000	23,223,000
Illinois	381,636,000	80,457,000	146,788,000	315,305,000
Indiana	14,164,000	4,382,000	4,843,000	13,703,000
Kansas	725,467,000	32,891,000	66,270,000	692,088,000
Kentucky	44,086,000	2,106,000	5,193,000	40,999,000
Louisiana	1,173,225,000	146,195,000	103,961,000	1,215,459,000
Michigan	51,078,000	3,265,000	19,764,000	34,579,000
Mississippi	6,642,000	37,980,000	4,380,000	40,242,000
Montana	93,460,000	2,751,000	6,768,000	89,443,000
Nebraska	50,000	3,950,000	251,000	3,749,000
New Mexico	687,168,000	43,974,000	39,001,000	692,141,000
New York	35,392,000	34,608,000	4,999,000	65,001,000
Ohio	31,692,000	1,761,000	3,169,000	30,284,000
Oklahoma	1,063,152,000	94,709,000	155,952,000	1,001,909,000
Pennsylvania	183,123,000	21,877,000	17,353,000	187,647,000
Texas	9,768,371,000	1,348,271,000	493,126,000	10,623,516,000
West Virginia	45,888,000	10,000,000	3,444,000	52,444,000
Wyoming	305,616,000	24,888,000	25,683,000	304,821,000
Miscellaneous*	150,000	300,000	88,000	362,000
Total	18,483,012,000	1,893,350,000	1,351,847,000	19,024,515,000

* Includes Tennessee, Missouri and Utah. † Indicates that new reserves discovered and revisions of previous estimates result in a negative net amount.

A.P.I. Estimates Half Billion Barrel Gain in U. S. Reserves

AN estimated increase of more than a half billion barrels in the proved unproduced petroleum reserves of the United States during 1940, lifting the total to a new high of 19,024,515,000 barrels on January 1, 1941, is shown by the American Petroleum Institute's Committee on Petroleum Reserves, which released its annual report last week.

The new peak volume is a result of the industry having found 1,893,350,000 barrels of new reserves during the year, as against production of 1,351,847,000 barrels; the new proved reserves discovered and developed during 1940 therefore having exceeded production by 541,503,000 barrels. These figures include all grades of crude oil and distillate known to be recoverable under existing economic and operating conditions. They do not, however, include any estimate of the reserves which may be found in areas known to be favorable to the accumulation of oil, but which as yet are untested.

This report shows that for the fifth consecutive year the petroleum industry has increased the nation's crude oil supplies by a greater amount than was produced. In commenting on the report, Institute Executive Vice President W. R. Boyd, Jr., said: "It should be comforting to the American people to know that in times like the present, with war clouds hanging low over the world, the American petroleum industry again has discovered and developed more oil in this country than has been produced . . . No other nation can boast such a record, nor enjoy the satisfaction of knowing so much oil is available."

Thirteen of the 23 oil producing states discovered or developed more oil than they produced in 1940. Texas made the largest gain in reserves, 1,348,271,000 barrels in 1940, and now is estimated to have a reserve of 10,623,516,000 barrels, or in excess of 50 percent of the nation's total. This is the first time in history any one state has surpassed 10,000,000,000 barrels in proven reserves.

Surprisingly large gains were reported from some states. Among these were New York, with reserves estimated at 65,001,000 barrels as against 35,392,000 barrels a year ago due to revisions and advancements in secondary recovery methods; Nebraska, with 3,749,000 barrels as against 50,000 barrels because of new developments, and Mississippi, with 40,242,000 barrels compared with 6,642,000 barrels as the result of additional drilling.

The A.P.I. Committee on Petroleum Reserves is composed of J. Edgar Pew, Sun Oil Company, Philadelphia, chairman; R. F. Baker, The Texas Company, New York; L. T. Barrow, Humble Oil & Refining Company, Houston; Frank R. Clark, The Ohio Oil Company, Tulsa; G. Clark Gester, Standard Oil Company of California, San Francisco; F. H. Lahee, Sun Oil Company, Dallas; J. M. Sands, Phillips Petroleum Company, Bartlesville; Fred Van Covern, American Petroleum Institute, New York; Theron Wasson, The Pure Oil Company, Chicago, and Fred E. Wood, Standard Oil Company (Indiana), Chicago.

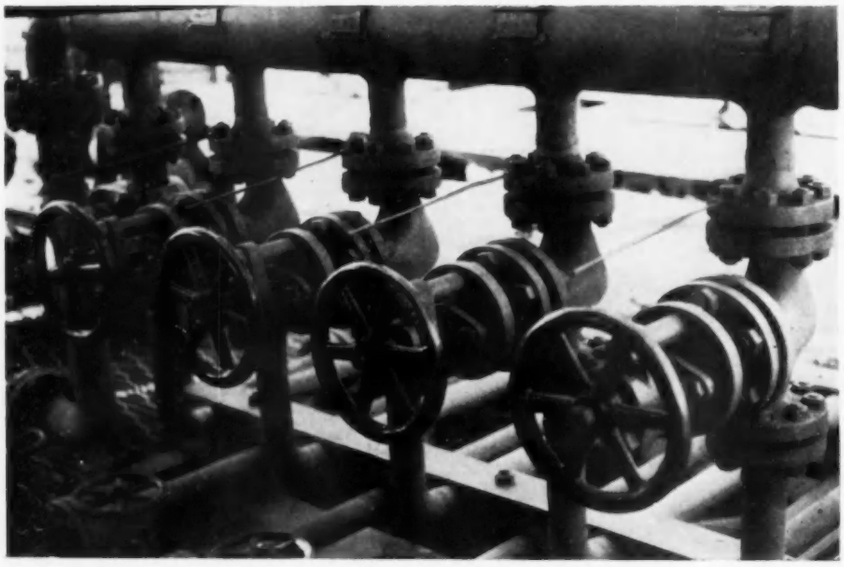
Practical Hints for the Drilling Rig

The following reports on rig practices contain suggestions of a practical nature, designed to improve operating efficiency and safety. These items come from all parts of the United States and give an excellent picture of the ingenuity being brought into play in drilling operations.

Contributions to this page will be paid for at the rate of $5 for each illustrated item accepted. Address contributions "The Editor, THE OIL WEEKLY, Houston, Texas."

1. BOILER OPERATION

Guides Aid in Proper Setting of Valves in Control Manifold on Feed-Water Lines



Pointers identifying chalk marks on the edge of valve wheels aid in proper setting.

SINCE oil field boilers in a battery vary slightly in operating characteristics, close adjustments are required to maintain uniform steaming without frequent changes in controls.

Above each valve on the branches from the feed-water manifold, one fireman has attached 14-inch lengths of ¼-inch welding rod, each welded to a washer of the proper size to fit on the bolts used in the flanges of the branch line. These rods, extending horizontally over the rim of each valve hand wheel, serve as indexes when used with reference marks checked on the wheels.

When a setting is obtained for normal operating conditions, the valve wheels are marked, permitting quick return to original conditions when some emergency or sudden demand has required shifting of the valves from the desired apertures. As chalk is used for marking, the reference marks may be changed easily when steam-demand requirements make a revision of the settings desirable.

Use of reference marks on the individual boiler-feed line valves eliminates most of the guessing otherwise required in attaining desired conditions of equal steaming at all units of a multiple-boiler setting, and frees the fireman for other work.

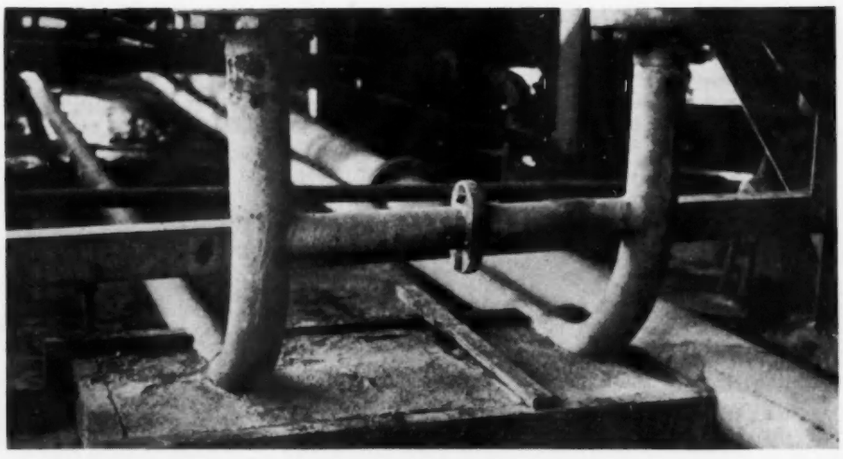
The ¼-inch welding rods used as indicators are light enough to be straightened by hand in case of accidental bending, and offer no hindrance to quick wheeling of the valves in case of emergency.

2. RIGGING UP

Anchored Mud Lines Lower Vibration

ANCHOR bolts, straps and other types of hold-downs normally used to dampen vibrations set up in high-pressure mud lines may be eliminated by pouring, at the point where the mud lines leaves the ground and turn upward to the standpipe connection on the raised derrick floor, a concrete form four feet long, two feet wide and eight inches deep.

The concrete need not complete-



Vibration is minimized by anchoring mud lines to standpipe in concrete setting.

ly cover the pipes, permitting it to be cracked away easily when the lines are removed on completion of drilling operations. The block effectively stops all vibration at this point, and eliminates the necessity of continually tightening or cinching down unions and other fittings in the line.

A horizontal flange-connected brace welded to each of the pipes accurately spaces the risers so that they will always line up with dual standpipes.

3. WIRE LINE CARE

Guard Protects Line At Drawworks

ACCIDENTAL contact with the wire line while racking pipe or working around the rotary can be lessened by a heavy steel shield. Fitted within the rope slot in the drawworks, the shield is equipped with paired lugs at the base to straddle the drawworks case, and with angle projections at the top which maintain it vertical and which are bolted to the drawworks at the inner edge of the usual aperture in the case.

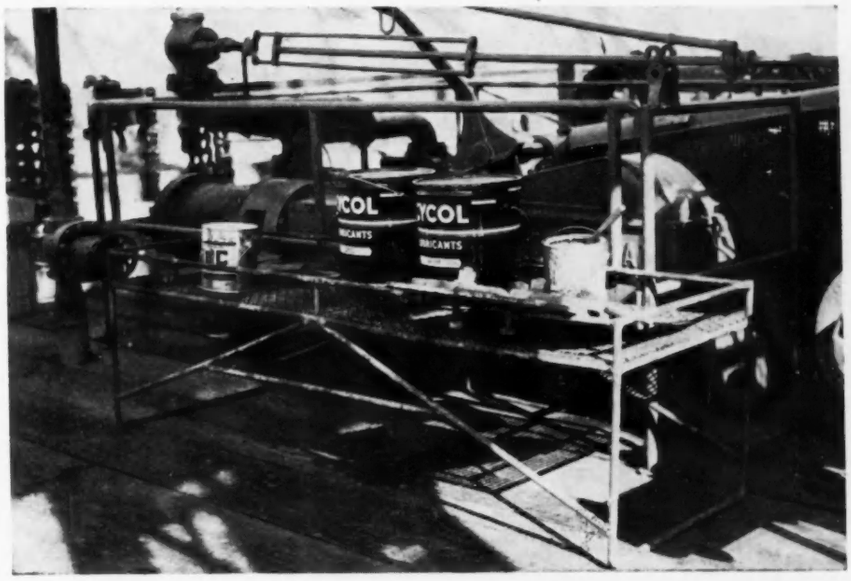
The shield also helps protect the drum and line against injury from tools accidentally dropped through the aperture. It also deflects water when a hose is used to wash down racked pipe, and prevents mud contamination of the line when a mud-box is employed.

Ample space for inspection of the line and spooling is provided around the ends of the shield, and the driller's supervision of the wire line is not impaired.

This shield on the drawworks guards against accidental contact with line.

4. GADGETS

Light and Sturdy Bench Serves Many Purposes Around Drilling Rig



This bench of sucker-rod material and metal mesh serves many purposes around rig.

NEATNESS, and the resulting safety to men and care of equipment resulting therefrom, is applied in a practical manner by the superintendent of one drilling company by employing low benches for lubricants and other supplies at strategic points around the machinery on each drilling well.

Made almost entirely of sucker-rod material, the light but sturdy bench is provided with a flooring of heavy metal mesh, and a low railing around the edges. An accidentally dropped grease paddle or cover will not fall to collect dirt or foreign material from the floor, and at the same time floors and walkways around the machinery are kept in a cleaner and safer condition.

The benches prove handy also when small gates, fittings, packing glands, etc., must be overhauled or worked upon near the equipment.

5. EQUIPMENT CARE

Unused Kelly Joint Given Protection

PROPER care and protection from kinking or bending of the kelly joint can not be over-emphasized, particularly for sizes below 5-inch.

One company using a 4-inch kelly joint takes an extra precaution by never rolling it out on the drill-pipe storage rack before first inserting it in a string of short joints of 6¼-inch light casing. The casing protects the corners of the joint from nicks or bending, and makes it easier and more quickly handled.

Two or three casing joints, each 10 to 15 feet long, are used instead of a single long one, as one or two men can block up one end to slip on the shorter joint.

This kelly joint is protected by insertion in several lengths of casing.

REFLECTION SEISMOGRAPH SURVEYS

☆ The cumulative experience of more than 20 field crews in diverse localities, and constant research in both field and laboratory enable us to render a seismograph service which we believe to be unequalled. ☆ Fully experienced crews available for work anywhere in the United States and Foreign Countries. ☆ Your inquiries are invited.

WESTERN GEOPHYSICAL COMPANY

HENRY SALVATORI, PRESIDENT

EDISON BUILDING, LOS ANGELES, CALIFORNIA ★ PHILCADE BUILDING, TULSA, OKLAHOMA

HIGHLIGHTS IN THE WEEK'S NEWS

Legislation

Cole Group to Complete Southwest Field Investigation

Members of the Cole subcommittee of the House Interstate and Foreign Commerce Committee next month will complete a field investigation which was halted last year by the sudden death of one of its members, the late Congressman Mapes, of Michigan, in New Orleans.

In all probability, the subcommittee will be in the southwest around the middle of April, if possible attending the quarterly meeting of the Interstate Oil Compact Commission, to which they were invited March 28 by J. C. Hunter, Texas member.

Cole, chairman of the group, disclosed he had received a telegram from the governor of Louisiana urging that the subcommittee study conditions in that state before writing its final report, which is to be submitted by the end of next month, and said there is a "strong possibility" that the subcommittee will complete its interrupted tour.

Illinois Group Protests Threatened Special Levies

Opposition to special tax levies and "discriminatory methods" of state control of the Illinois oil industry was voiced last week by Harold S. Williams, president of the Independent Oil Producers Association of Illinois.

Following a meeting of association directors, Williams issued a statement declaring:

"The association will continue and intensify its efforts in behalf of the independent operators of this state and in behalf of land owners and persons interested in royalty ownership. Problems of taxation are being studied. While the oil industry expects to pay, and is willing to pay its full and fair share of the general heavy burden of taxes, it should oppose special levies and discriminatory methods, either state or national. Opposed to permitting Illinois to be deprived of its natural market, the association will support a fair and reasonable conservation bill, designed to eliminate waste and insure for Illinois the full benefit of its great natural resource."

Texas House Kills Bill For Separate Oil Commission

The Texas House last week killed a bill to create a separate oil and gas commission. It sought to remove those duties from jurisdiction of the Texas Railroad Commission, leaving pipelines, railroads and motor trucks for that body to administer.

The bill had come out of committee by a 11 to 8 vote, and proponents hoped they had enough strength to put it through. However, it was killed by a vote of 86 to 57.

While the issue was doubtful throughout, even the most optimistic opponents of the bill were surprised at the result. Proponents have been working on the measure for nearly two years, and believed it would pass in the House, although they were doubtful about the Senate.

Distillate Proration

Shortly after the House committee on oil and gas sent to a subcommittee a bill providing for proration of distillate, the Senate committee reported the bill favorably. However, the vote was so close that Chairman Allen Shivers had to break a tie for the bill's approval.

At a committee hearing, several representatives of recycling plants and owners of distillate wells testified that operation was so expensive that the larger allowances were required. They also pointed out that the total distillate production was only a few thousand barrels a day, and did not constitute a large part of the Texas market for oil.

Proponents of the bill insisted that distillate, like other oil, should be prorated, and not allowed to take more than its normal share of the market based on the number of wells which were producing this oil.

During the Senate committee hearing, a substitute was offered to rewrite the conservation law and add the word condensate wherever it was appropriate. Otherwise, the law would remain unchanged.

The Senate began hearings on the House omnibus tax bill, and while some members believed that the rates would be cut materially so the bill would raise about $15,000,000 instead of $30,000,000, there was considerable doubt as to its outcome.

News Index

General:

Allowables	74
Legislation	69
Washington	69
Markets-Statistics	76
Men in News	111
World-Wide Developments	82

U. S. Field Operations:

Arkansas	101
California	102
Completions	103
East Texas	94
Forest City Basin	87
Illinois	87
Indiana	87
Kansas	88
Louisiana Coast	98
Michigan	101
Mississippi	101
New Mexico	102
North Louisiana	100
North Texas	92
Oklahoma	87
Southeastern States	101
Southwest Texas	96
Texas Gulf Coast	98
West Texas	90
Wildcat Development	107

Washington

Defense Officials Say No Federal Oil Control Needed

The oil industry can meet all possible demands of the defense program, is cooperating heartily with the government, needs no federal control and should not be interfered with, members of the Cole oil subcommittee of the House Interstate and Foreign Commerce Committee were told March 27 by Dr. Robert E. Wilson, chief of the petroleum unit of the Office of Production Management.

Appearing as the first witness before the subcommittee at its final hearings on its oil investigation, Wilson revealed that the recent report of the National Resources Planning Board, strongly urging regulation of the industry, had been written without any consultation of National Defense Advisory Commission or OPM officials by members of the board.

He told the committee flatly that he did not agree with the recommendations of the report.

The hearings, which Chairman William P. Cole, Jr. hopes to conclude on April 4, were designed to go into the ability of the industry to meet the requirements of national defense, but more especially to explore the pipeline situation, in line with President Roosevelt's recent letter to Committee Chairman Clarence F. Lea for a study of the necessity for federal legislation to push the southeastern pipelines to completion over the opposition of the Georgia railroads.

Representative Lea is now a member of the oil subcommittee, replacing Representative Herron Pearson who has switched to another subcommittee, but refused to take the chairmanship from Congressman Cole.

Federal Member on Compact

An early development of the hearing was the suggested possibility of an amendment in the law ratifying the interstate oil compact, giving the federal government a place on the compact commission, when the measure comes up for renewal this session. The suggestion was made by Cole after Wilson had agreed that federal representation would be desirable and had pointed out that an invitation had been extended to federal officials by the commission to sit in on its meetings as guests.

Opening his testimony with an overall statement on the situation, which he later amplified in executive session at which he disclosed plans and statistics which it was felt advisable not to make public, the OPM oil chief told the committee that "thanks to proration, and other conservation activities, the production branch of the petroleum industry is today able to meet any increase in demand which may conceivably be made upon it.

"No branch of the industry is in better shape to meet emergency demands than is the producing end, but to remain in this healthy condition obviously requires the continuation of exploration,

wildcatting, and reasonable drilling activities," he declared.

Wilson estimated that as a result of increased industrial requirements and improved consumptive power, the total domestic demand for petroleum products this year will be eight or nine percent greater than that of 1940.

With respect to the military situation, he pointed out that the government's training program contemplates use of a substantial part of the planes and mechanized equipment and naval vessels now available, so that "the further increase in demand due to actual participation in war would not be nearly as large as would be calculated by figuring what all our military equipment would consume."

Percentage increase in demand for various products naturally differs, but on the whole, he said, "if we should become involved in an all-out war effort by the end of this year, the further increase in demand for the major petroleum products would be somewhere between five and ten percent" additional to the increase in civilian requirements.

"This figure," he explained, "may seem small in view of the obviously large demands of mechanized war and the difficulties this country experienced in meeting the great increase in demand during the last war. It must be remembered, however, the petroleum industry's production of gasoline has increased about twelve-fold since 1916, and that our shutdown refining capacity today is much larger and more efficient than was the entire refining capacity of the country even in 1918. Also, there was then no large available reserve of shut-in crude production such as exists today."

30 Percent Increase Easy

As against the relatively slight increase in demand which is foreseen, he informed the subcommittee, it would easily be possible to make a 30 percent increase in our present high rate of crude production and continue this for a two-year period without any major new discoveries or any unusual amount of drilling.

The degree of expansion which could be made in the refining branch of the industry is not quite as large as in the case of production, he continued, but an increase of fully 25 percent could be made in the country's refining capacity merely by starting up capacity now shut down, although this would mean some reconditioning of old equipment and use of some relatively inefficient facilities.

He said, however, that the present shut-down capacity is greater and more efficient than the entire capacity of the industry at the close of World War I, but "to remain in this favorable position the refining industry must continue to build to keep pace with the growth of peacetime demand, and keep the reserve of 20 to 25 percent of shut-down capacity available for emergency demands."

Similarly, Dr. Wilson found, the ability to expand also exists in the field of transportation, with one special situation excepted, and a 20 percent expansion in the amount of crude and products transported by pipe lines could be handled on short notice and with little additional construction, while the same is true of tank car transportation in the interior.

"The only possible bottleneck which gives us concern is in tanker transportation to the East Coast," he explained. "About 95 percent of the petroleum products consumed by the east coast states is delivered there by tanker, either in the form of crude or refined products, and mainly from the Gulf Coast. The movement from the Gulf Coast alone amounts to about 1,250,000 barrels per day, and requires the services of a fleet of 260 domestic tankers. This large tanker fleet normally has some excess capacity, but a combination of circumstances has resulted in a rather tight situation at present.

"These circumstances are, first, the fact that a large percentage of our tanker fleet was built during and shortly after the last war, and hence is nearing the end of its useful life; second, during the past two years a considerable number of ships has been transferred into foreign service to replace ships which have been sunk and to make up for the longer hauls and less efficient use of tankers brought about by war conditions. In addition to this, eight large, high-speed tankers have already been requisitioned by the Navy and several more are likely to be so requisitioned, especially in the event of war. As a result, there has been some shortage in tankers during each of the last two winters when the peak demand for heating oils tends to create a shortage.

Emphasizes Pipeline Need

"In the event of a naval war in the Atlantic, which might result in the loss of some tankers and necessitate the use of a convoy system, there would undoubtedly be serious difficulty in supplying civilian requirements on the east coast and for this reason we have been urging the industry to relieve this situation by all possible means. Such means include the building of more storage on the Atlantic seaboard, so that reserve stocks can be built up and tankers can be used effectively during the slack season; the building of more tankers, 25 of which are expected to be delivered during this calendar year, and the building of any pipeline or barge transportation facilities which can be undertaken by private capital to help to supply the east coast without involving the tanker haul around Florida."

In the field of special products, the oil industry is making successful efforts to meet all needs. This is particularly true of 100 octane aviation gasoline, which is being turned out by some 18 establishments despite the fact that the construction of synthetic plants for its production is quite expensive, Dr. Wilson said. The industry already has constructed enough capacity to meet more than twice the present domestic and foreign demand and is building up substantial stocks, so that estimated requirements for at least the next 15 months can be met without further construction than that already announced.

The petroleum unit also has recommended that the Navy build up substantial reserve stocks of heavy fuel oil, particularly on the east coast, where there is much less available for emergency needs than on the Pacific, and has suggested designs for underground storage of both fuel oil and aviation gasoline.

"The petroleum industry has been, and in my opinion will continue to be, able to supply every foreseeable demand for petroleum and its products without requiring any government funds or advance government contracts," he said in summing up the current situation. "Of course, this statement does not necessarily apply to new construction required to help meet shortages in other industries, such as the production of synthetic toluene and synthetic rubber from petroleum.

"Not only can all military demands for petroleum products be met without difficulty, but there seems to be no probable necessity for any civilian curtialment, barring the possible shortage in transportation to the east coast which I have already mentioned. Substantial civilian curtailment in this country would not only be far more disruptive than it has been in Europe, but would deprive federal, state and local governments of much needed revenue at a critical time.

"Industry Is Cooperative"

"The industry has shown a very cooperative attitude in all its contacts with the petroleum unit, and has repeatedly indicated its willingness to do anything within reason to prepare to meet all defense needs as soon as they are informed with regard thereto."

Turning his attention to the southeast pipe lines, Wilson declared that from a standpoint of national defense they are "definitely desirable," and that "to permit one interstate carrier to block the right of way of another interstate carrier, especially under the emergency conditions we are facing, is indefensible."

In the event of an emergency which would slow down or cut off the tanker movement, the railroads and truck lines would be unable to carry the load. The southeast, he pointed out, is the only part of the country which now does not have the benefit of pipeline transportation, "and yet from a national defense viewpoint this is the most important place to have it in order to reduce the amount of tanker transportation required around the Florida peninsula.

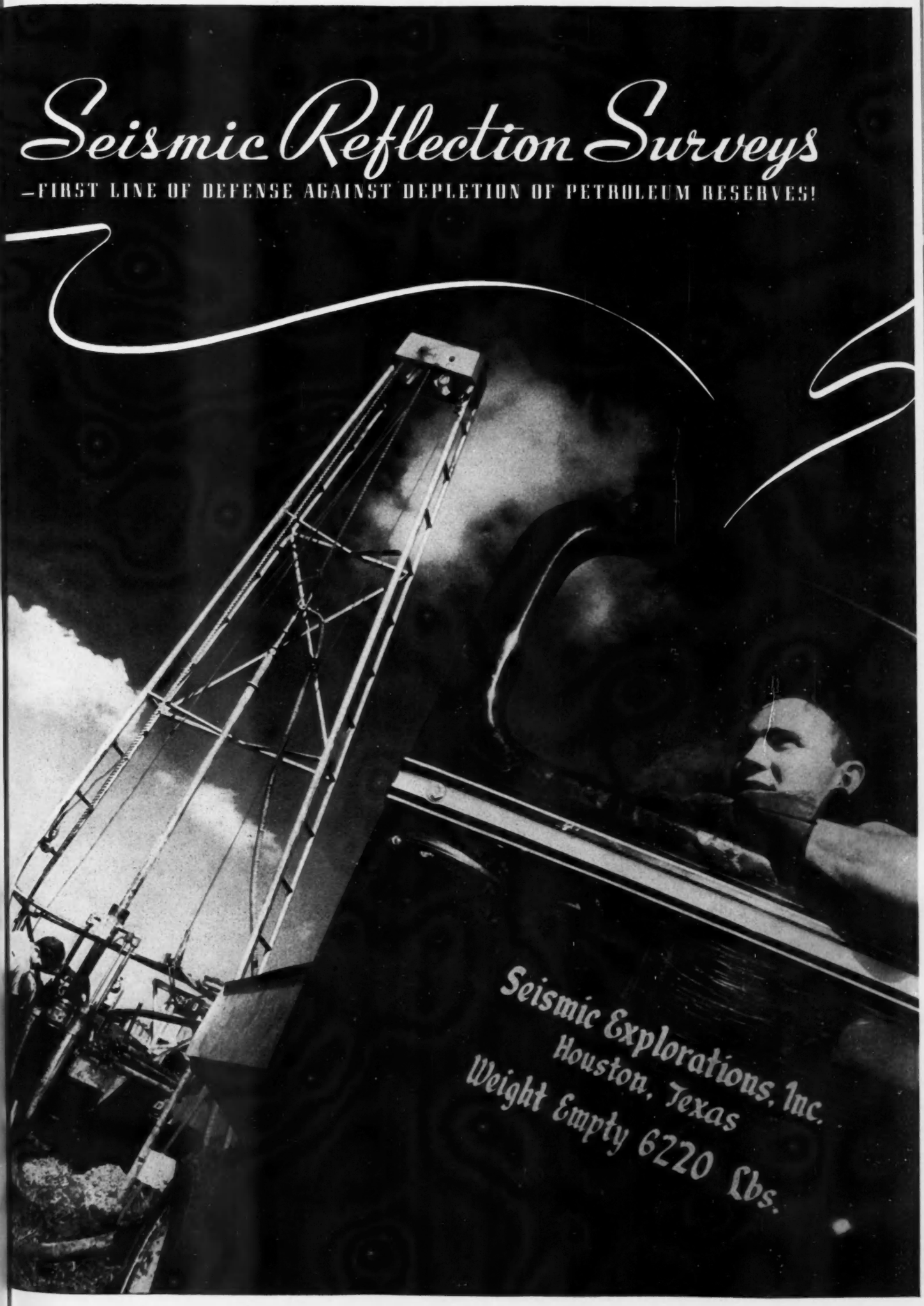
"It seems fortunate that it is possible to have such facilities constructed by private capital if the legal obstacles can be eliminated," he commented. "It is difficult to understand the unwillingness of the Georgia legislature to pass the necessary enabling legislation in view of the recent united recommendations of the President and the Secretaries of War, Navy and the Interior, but it would seem that it must be based on a lack of appreciation of the seriousness of the situation."

Discussing the situation with members of the subcommitee, Wilson pointed out that Representative Carl Vinson introduced a resolution in the House on March 23 instructing the Secretary of the Navy to appoint a board of officers to investigate the matter and report to Congress, but added that Navy officials have been interested in the southeastern pipelines for many months and have kept in close touch with developments.

Under questioning by Lea whether he thought that, in the event Congress passed legislation permitting private corporations to acquire rights-of-way by condemnation, the pipe lines so made possible should be subject to government approval and control, the OPM official said he thought that was a question of law which he could not answer. In the case of crude lines required to link up new fields, he suggested, the length of time required for the formalities of securing a certificate of necessity might be embarrassing, but so far as lines for refined products are concerned, they are usually built only after

Seismic Reflection Surveys

—FIRST LINE OF DEFENSE AGAINST DEPLETION OF PETROLEUM RESERVES!



considerable consideration and the time factor would not be so important.

Wilson Not in Accord with NRPB

Questioned by Chairman Cole regarding the National Resources Planning Board recommendations, Wilson said frankly that he was not in accord with them.

No member of the board ever consulted with the National Defense Advisory Commission or the Office of Production Management "and certainly not with the petroleum unit," he said.

While there can be no dispute with the board's assertion that petroleum products are essential to national defense, he added, "beyond that I cannot agree with the report."

There is no need for allocations, he contended, because the oil industry is one of the few in the country which "can take national defense in its stride and meet all possible demands upon it without calling for government aid," and super-imposition of federal control "at a time when private enterprise should be at a premium" would be highly inadvisable.

So far as the board's suggestion that up-to-date statistics should be compiled, he pointed out, the United States Bureau of Mines alredy is doing that and the petroleum unit is studying defense requirements all the time, while its recommendation for creation of a federal oil conservation body overlooks the fact that an Oil Conservation Board already is operating and doing a good job.

So far as Illinois is concerned, he told Mr. Cole, that state injured itself more than it did the nation when it failed to adopt conservation laws. There was some waste of oil, he admitted, but it was slight and the greatest waste was in manpower and the construction of refinery capacity and pipelines. Today, Illinois production has passed its peak and is on the down-grade, and there is a strong probability that it shortly will adopt conservation legislation.

In that connection, he said the Interstate Oil Compact Commission is operating satisfactorily, but he agreed with Cole that participation in the commission's deliberations by federal experts would be desirable.

Military Requirements Established

Military requirements for oil products under an "all-out" war condition would total only about 125,000,000 barrels, or approximately ten percent of the 1940 output of 1,352,000,000 barrels of crude, the subcommittee was told March 28 by Major Clifford V. Morgan.

Army needs, Major Morgan said, would be 25,000,000 barrels, the figures for both Army and total military requirements being exclusive of aviation gasoline. The estimated requirement for 100-octane aviation gasoline, at the end of the present expansion program, would be 24,400 barrels a day, it was testified by Major D. G. Lingle, of the joint Army-Navy Aeronautical Board, who withheld more detailed information for submission in executive session.

Major Morgan estimated that the military (Army and Navy) needs for oil products would be 26,000,000 barrels of motor gasoline, 3,000,000 barrels of diesel oils, 100,000,000 barrels of heavy fuel oils, 1,000,000 barrels of lubricating oils and 150,000 barrels of kerosene.

He testified that he could see no need for the proposed southeastern pipe lines, since only a small part of the new army is located in that area. He was sharply called to task for his statement by Cole, who pointed out he was directly contradicting the Secretary of War, who had written the committee the pipe lines were highly desirable from a national defense standpoint.

Displaying a far more complete knowledge of the situation than had the Army representative, Rear Admiral H. A. Stuart, director of naval petroleum reserves, told the subcommittee the two proposed pipe lines were "highly desirable" from a military standpoint, although possibly not essential.

He made it plain, however, that the Navy department, which has gone on record many times as favoring "true" conservation, has little interest in either control or pipe line legislation from a military point of view.

Admiral Stuart said the department had nothing to add to the statement he made when he appeared before the subcommittee last year, and in answer to questions as to how the Pacific fleet would be provided for in the event of a war in which the Panama Canal was out of commission, assured the subcommittee that there are ample supplies on the Pacific coast to meet all requirements.

Industry Representatives Heard

With the official viewpoint received, the subcommittee turned its attention to the industry and heard an exhaustive report on the activities and policies of the Interstate Oil Compact Commission from J. C. Hunter, Abilene, Texas, one of a committee of three designated by Oklahoma's Governor Leon C. Phillips, Compact chairman, to represent the commission at the hearings.

"Any change in the now efficient operation of the regulation of an industry so important to our national defense would result immediately in a disruption of the smooth functioning which now brings confidence to the office of production management," Hunter warned. "Tampering with such an efficient machine by inexperienced mechanics could result in no benefit to public welfare."

Outlining the many activities of the compact commission, the witness pointed out that additional states are considering oil legislation, and expressed confidence that the conservation movement soon would have the support of all states with present or prospective production.

"The entire conception of conservation is the outgrowth of the activities of the petroleum industry itself through production practices and refinery technique," he explained. "These practices may be divided into two general subheads. The production practices involve the new development of exploring for petroleum reserves and after location, the drilling to recover the oil from these reserves. Improved exploration, production and drilling technique have brought about the discovery of vast additional petroleum reserves.

"In addition to this improvement in our ability to explore for petroleum reserves, secondary recovery methods have developed to the point that many fields heretofore recognized as exhausted or near exhaustion have been given new life, and through these methods we are now able to recover a far greater percentage of the oil from such reserves than was then considered possible."

Hunter declared the effect of the development of conservation laws "has necessarily been slow because the very nature of the political organization in this country is such that a period of education must precede the realization of legal expression."

"The compact commission has become a working example of the guidance and control of a most important industry in a truly democratic manner," he said. "Those who would supplant this commission with a more centralized control are answered by the effective performance and ever-increasing efficiency of the commission's work. The record of accomplishment of the commission is answer to such criticism."

Recommendations of the National Resources Planning Board for federal control and other steps were challenged by Hunter, who told the subcommittee that "no need has yet arisen, nor can we visualize any need, for such economic control with respect to petroleum resources.

"It has been the office of the compact to furnish a forum through which the states themselves are accomplishing every desirable proposal for the prevention of waste made by the national resources planning board," he declared.

"Most of these accusations of waste in the oil producing industry go back to periods before state-administered conservation, or to the time when this conservation was less efficient than it is today."

The subcommittee will resume its hearings April 1, at which time it will undertake a survey of the southeastern pipe line station.

Power Commission Questions Gas Use Effect on Oil

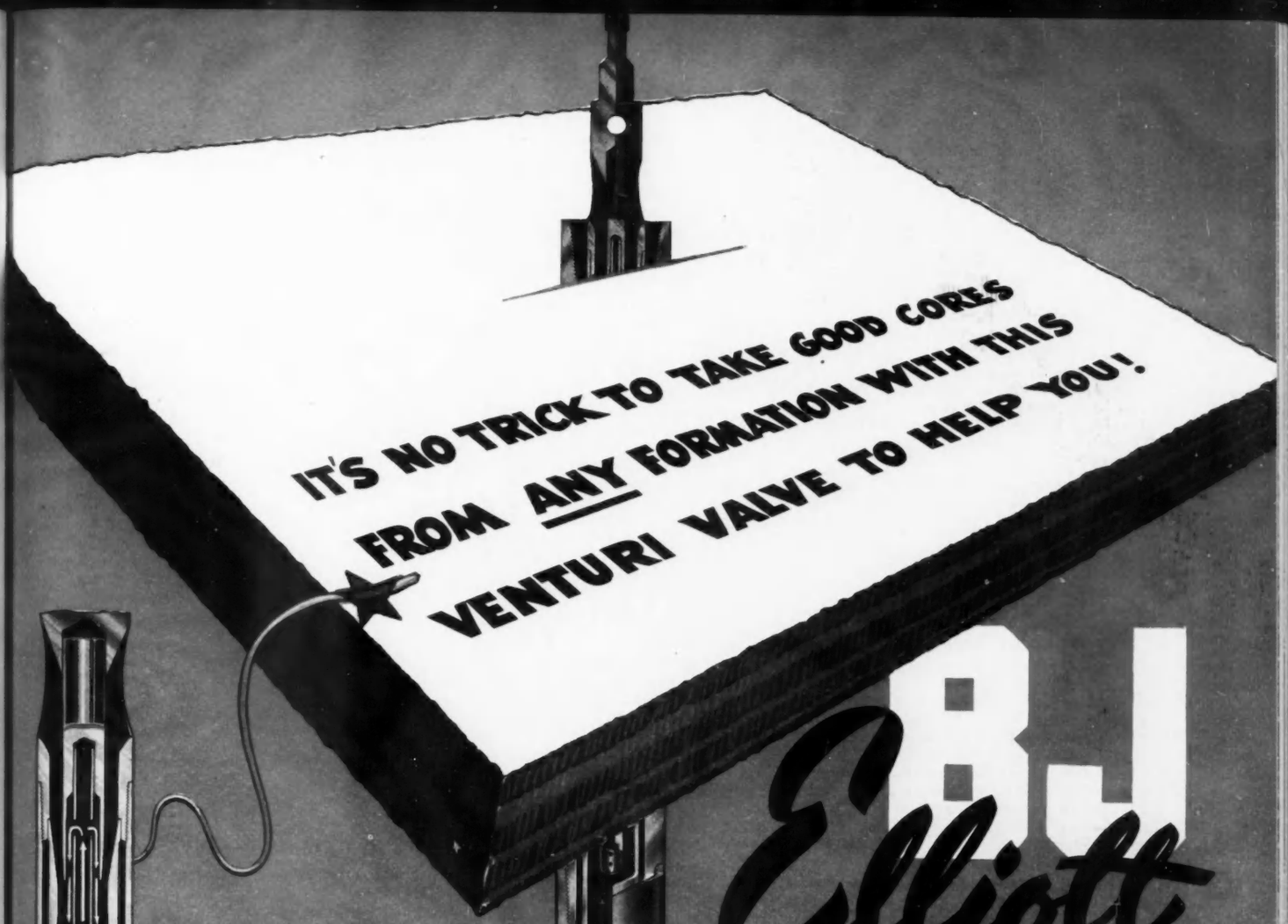
Fears that the rapid expansion of natural gas consumption may threaten the nation's oil supply were voiced March 24 by the Federal Power Commission, with the suggestion that Congress amend the natural gas act to give it the power to solve conservation problems, enabling it to exercise a measure of control over the petroleum industry.

The commission's views on the question of natural gas were made in its twentieth annual report, in which it pointed out that it has before it an application for a certificate permitting construction of a 1500-mile pipe line from South Texas to New York which will be capable of delivering 250,000,000 feet a day.

"This first proposal to tap the southwestern reserves of natural gas to supply the tremendous markets available in the northeastern states poses the country with a serious problem of energy resources conservation," it was declared. "The natural gas act as presently drafted does not enable the commission to treat fully the serious implications of such a problem."

The major question involved, the report continued, is whether the proposed line would not result in displacing a less valuable fuel and create hardships in the industry already supplying the market, while at the same time rapidly depleting the country's natural-gas reserves.

"There is an even more important question which should be answered before government sanction is given to large scale delivery of natural gas to the great eastern industrial areas," Congress was told. "That is the question as



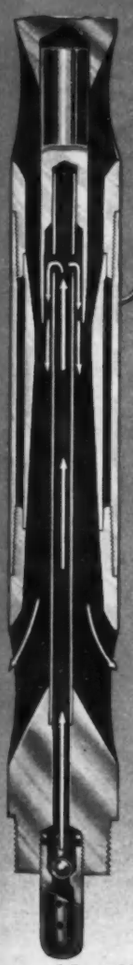
BJ Elliott

WIRE LINE CORE DRILLS

... enable any experienced driller to drill fast, straight, full-gauge hole at practically the same speed as for straight drilling — and accurate, full-length cores can be taken whenever desired from any formation due to the unique, exclusive Venturi Valve described at left.

Ask the Byron Jackson office nearest you for complete details and convincing facts — no obligation is incurred.

BYRON JACKSON CO.
Los Angeles • Houston • New York

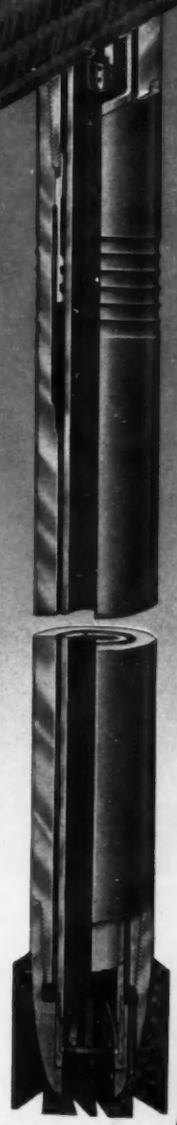


HOW THE VENTURI PRINCIPLE HELPS TO TAKE BETTER CORES

When fluid is directed through a Venturi Tube, the *pressure is lowest at the point of highest velocity.* At the top of the Inner Barrel Assembly of the BJ Elliott Wire Line Core Drill a Venturi opening is provided, and by leading passageways from this point of minimum diameter to a point just above a ball check valve inside the extreme upper end of the Inner (Core Taking) Barrel, an upward suction is exerted through the Inner Barrel. Under average conditions this upward suction reduces the pressure inside the Inner Barrel considerably below the pressure outside of the Inner Barrel and at the bottom of the hole.

The suction resulting from this reduced pressure permits soft sands (even when interbedded with shales) to enter the Inner (Core Retaining) Barrel in long, true-shaped cores, and assists in taking cores from formations previously considered impossible to recover.

This Venturi Valve is an exclusive feature of the BJ Elliott Wire Line Core Drill, and it alone merits your careful study and consideration of this successful device.



Efficient, streamlined, piloted-type bits have circulation holes close to bottom to clean and cool the cutting and reaming edges and to flush away cuttings to avoid re-grinding. All wearing surfaces are heavily faced with Tungsten Carbide.

Hard Formation Bits are furnished with roller cutters having either coarse teeth for shales or fine teeth for hard sand and rock. An exaggerated scale is used above for better illustration. The Tungsten Carbide faced teeth are unsurpassed for cutting action and long life.

The Standard Spring Type Core Catcher (left view) is used for ordinary formations, hard sand and rock; the Basket Type for soft sands and loosely consolidated formations.

LOOK FOR THE BJ SECTION IN THE 1941 COMPOSITE CATALOG

to whether rapid depletion of the country's natural-gas reserves may not reduce for all time the country's potentially recoverable reserves of oil.

"In view of the tremendous importance of petroleum products in both peace and war, it would be a grave mistake to allow the quest for quick profits and temporary convenience to cut into our available petroleum supplies.

"The commission is convinced that these conservation problems are of such pre-eminent importance, especially in the present world situation, that the natural gas act should be immediately broadened to give the commission power to resolve them in the public interest."

The report explained that while estimates of the known natural-gas reserves range from 60 to 75 trillion feet, the "generally accepted" figure is 66 trillion feet, of which 51.5 trillion feet is in the central and southern states, 7 trillion in California, 6 trillion in the eastern states and 1.5 trillion in the Rocky Mountain states.

"At the present time the rate of consumption of this commodity approximates 2.4 trillion cubic feet per year for all purposes," it was stated. "At this rate of withdrawal, the estimated total volume of reserves would last approximately 27½ years. However, the actual life of the country's natural-gas reserves cannot be definitely fixed in view of the fact that on the one hand new fields are continually being discovered and developed while on the other the market for natural gas is rapidly expanding."

The report pointed out that the commission now has jurisdiction only over proposed new pipe-line construction where the new line will enter a market area already being served by another natural-gas company, which prevents any serious effort to control the unplanned construction of pipe lines with a view to conservation, and recommended that the act be broadened to give it control over all new interstate natural-gas pipe-line construction. It urged also that the commission be given regulatory authority over rates on gas sold for industrial as well as domestic and commercial purposes.

Allowables

Effective Control of Wells Due Under April Allowables

Allowables for April conform closely with Bureau of Mines estimates of demand for domestic crude during the month, and actual production may be expected to practically coincide with market requirements.

March allowables resulted in holding of crude stocks at virtually unchanged level, and April schedules in the aggregate are about 20,000 barrels a day stricter than those of March, in relation to demand.

Eight prorated states, which account for 84 percent of the nation's current crude oil production, adopted April allowables 81,592 barrels daily below indicated market demand for crude from those states, as shown in an accompanying table. One of them, California, consistently produces about 40,000 barrels a day in excess of its state allowable, but the others hold actual production close to prescribed volumes. Consequently for the 8 states, actual production should be around 40,000 barrels under estimated demand.

These figures do not take into account the "creep-up" in allowables in several states, arising from completion of new wells. But that situation may be at least partially compensated by continued inability of Illinois to produce its share of demand, the underproduction there being around 10,000 barrels daily.

Continuing to use its new formula, the Texas Railroad Commission promulgated an April order that provided for a net allowable of 1,373,359 barrels daily, but the commission estimated that operators would produce about 3½ percent less than the assigned allowable. Deduction of that underproduction (48,068 barrels) indicated that net production should be 1,325,291 barrels daily, or 30,009 less than the Bureau of Mines estimate of consumer demand for Texas oil in April.

The Texas proration schedules indicated that the total state allowable would be 1,857,960 barrels daily, but use of shutdowns was due to cut the net allowable to 1,373,359 barrels. Most of the fields will be closed 10 days: April 5, 6, 9, 12, 13, 19, 20, 26, 27, and 30. The East Texas field will be closed otherwise on the same days that the rest of the state is shut in. The Panhandle, closed for 5 days in March, will be closed in April only four days: April 6, 13, 26, and 30.

Old Ocean and Hamman, Texas Gulf Coast, where operators last month filed suits attacking the commission's orders, will be allowed to produce according to February schedules until tests have been made on the wells in the fields.

Greatest increases in quotas were authorized for West Texas, where Yates was raised 4414 barrels to 22,007 daily, Wasson 4325 barrels to 48,789, and Goldsmith 1511 to 32,022. On the Gulf Coast Conroe was increased 4625 barrels to 46,700 daily and Anahuac was raised 4325 to 19,140 daily.

(The Texas commission last week set a hearing for April 8 to determine whether North Cedar Creek field in Bastrop County should be exempt from shutdown.)

Although Oklahoma's allowable was left unchanged at 400,000 barrels daily, increases were given in Avoca, Coyle, East Cromwell, Cumberland, Dill, and North Shawnee pools, and the Oklahoma City Wilcox zone was reduced for the first time in a year.

The 5297-barrel reduction in Louisiana's allowable to 300,893 daily for April involved a cut of 1776 barrels to 67,702 daily for North Louisiana and one of 3521 barrels to 233,191 daily for South Louisiana.

Refining Capacity Equal To Defense Needs

Refining capacity of the United States is adequate for all needs of 1941, according to the United States Bureau of Mines. Its statement, concerning its annual survey, did not mention national defense specifically but the reference to "any expected increase," indicates that military and defense needs were considered in estimating the situation.

Lenzner Proposes Oil Show at New Orleans

Plans for an oil exposition to be held in New Orleans sometime the latter part of the year were presented last week to the New Orleans Association of Commerce and Municipal Auditorium officials by E. G. Lenzner, manager of the Houston Oil-World Exposition. No official announcement has been made, and it is not known what action will be taken on Lenzner's proposal. It is reported that if an oil exposition is held in New Orleans, an effort will be made to have it sponsored by the Louisiana Petroleum Association.

At the annual membership meeting of the Oil-World Exposition held in Houston February 25, it was voted to postpone the show originally scheduled for Houston in April, 1942, until April, 1943, to avoid conflict with the International Petroleum Exposition at Tulsa, May, 1942. The vote of the membership followed a recommendation of the exposition's executive committee, as reported by John R. Suman, president. At the same time the executive committee voted to close the offices of the Oil-World Exposition and to remove employes from the payroll, within 90 days, to avoid unnecessary expense.

April Allowables Foreshadow Holding of Crude Production Approximately in Balance with Demand

(Barrels Daily)

STATE	Bureau of Mines Estimate of Demand	State Allowable Beginning of Month	Difference of Allowable from Demand	Percent Difference of Allowable from Demand
Arkansas	75,700	72,024	— 3,676	— 4.9
California	596,300	571,500*	— 24,800	— 4.2
Kansas	200,700	210,700	+ 10,000	+ 5.0
Louisiana	299,700	300,893	+ 1,193	+ 0.5
Michigan	44,000	38,000†	— 6,000	— 13.6
New Mexico	109,000	110,000	+ 1,000	+ 0.9
Oklahoma	429,300	400,000	— 29,300	— 6.8
Texas	1,355,300	1,325,291‡	— 30,009	— 2.2
Total 8 Prorated States	3,110,000	3,028,408	— 81,592	— 2.6
Illinois	336,000	328,400§	— 7,600	— 2.3
Other States	263,300	.....	.....	.....
TOTAL UNITED STATES	3,709,300	.....	.....	.....

* Recommendation of Conservation Committee of California Oil Producers.

† Estimate of actual production that will occur under prescribed regulations.

‡ Texas Railroad Commission's estimate of actual net daily production allowing for usual under-production of 3½ percent under net allowable, which at the beginning of April is calculated at 1,373,359 barrels daily. However, allowable normally increases as new wells are completed. Under April order, most Texas fields were ordered shut down April 5, 6, 9, 12, 13, 19, 20, 26, 27, and 30. Texas Panhandle was ordered shut down April 6, 13, 26, 30.

§ Average level to which unprorated Illinois production had naturally declined for 4 weeks ended March 22, 1941

Our Contributions to the Oil Industry . . .

As specialists in equipment designing and manufacturing E. L. I. has developed and offered many types of precision equipment, for use in geophysical work and in petroleum production, to the oil industry.

Outstanding among our many contributions to the industry are: Seismic equipment designed and developed for Seismograph Service Corporation; instruments developed for Barnsdall Oil Company for use in well logging trailers operated by Baroid Sales Division. E. L. I. also manufactures, under license from the Humble Oil & Refining Company, Subsurface Pressure Measuring and Recording Instruments, and Laboratory Testing Equipment.

Well logging by Radioactivity, a method of obtaining accurate logs of cased wells, was developed in the laboratories of E. L. I. This service is available through Well Surveys, Inc., who have licensed Lane-Wells Company to offer this service in the United States, and Seismograph Service Corporation — to offer the service in Trinidad and Venezuela.

Equipment developed and manufactured by E. L. I. has been operated on every continent and in every area where petroleum exploration has been conducted or petroleum is being produced.

See Our Equipment Display Booth No. 30 A.A.P.G.

Being so recognized as experienced designers and manufacturers of precision equipment, it is natural that E. L. I. would be selected to participate in the National Defense Program by producing several specialized articles.

The "E. L. I. Engineer" is published bi-monthly. If you would like to receive the "Engineer," send your request to . . .

Engineering Laboratories, Inc.

CONSULTING ENGINEERS AND MANUFACTURERS

TULSA, OKLAHOMA, U. S. A.

Strong Demand Indicated By Changes in Stocks

Strong demand for all principal petroleum products was reflected in the latest statistics of the industry, covering the week ended March 22. Crude runs to stills were increased sharply, to 3,655,000 barrels daily from 3,550,000 the previous week, but only the moderate amount of 560,000 barrels of gasoline went into storage, and withdrawals of both light and heavy fuel oils from storage continued. Draft from stocks of light oils was a little over 1,000,000 barrels, and that from heavy fuel stocks also exceeded 1,000,000 barrels.

Crude oil production in the United States averaged 3,681,000 barrels daily in the week ended March 22, the American Petroleum Institute reported. That was about 20,000 barrels more than daily output the week before, but about 190,000 barrels (5 percent) less than production in the corresponding week of last year, and only 25,000 barrels more than current average daily market demand for domestic crude as estimated by the United States Bureau of Mines.

Refinery runs of crude averaged 3,655,000 barrels daily in the week of March 22, or 105,000 barrels a day more than in the preceding week. The new rate also was about 100,000 barrels daily, or 3 percent, above the daily average runs of March last year.

Gasoline Accumulation Moderate

Production of gasoline was reported by the institute at 12,094,000 barrels for the week of March 22, compared with 12,197,000 barrels in the preceding seven days. The weekly average output in March of last year was only 11,175,000 barrels.

Stocks of finished and unfinished gasoline in the United States were increased 562,000 barrels, from 98,979,000 to 99,541,000 barrels, and the latter amount, on hand March 22, was 2,745,000 barrels (2.7 percent) less than that of 102,286,000 barrels in storage at the corresponding time last year.

These figures include aviation gasoline, which is held in larger quantity now than a year ago, the present inventory of that material being 6,438,000 barrels against 4,415,000 held at this time last year.

Deducting these quantities from the previously given totals, it is shown that present stocks of regular gasoline amount to 93,103,000 barrels, or 4,768,000 barrels less than the 97,871,000 barrels on hand a year ago. This 5 percent reduction of the stocks of ordinary gasoline from a year ago is attended by total demand about 10 percent greater than a year ago. Consequently, the gasoline market is on a much sounder statistical foundation than it was at this time last year.

Fuel Oil Stocks Used

Stocks of light fuel oils were reduced 1,048,000 barrels in the week ended March 22, from 31,643,000 to 30,595,000 barrels, as demand continued good. The remaining supply was 7,000,000 (30 percent) larger than that of a year previously. But stocks a year ago were largely depleted. Furthermore, normal demand has been materially increased since a year ago through installation of numerous new oil burners.

Heavy fuel oil stocks were further reduced 1,072,000 barrels in the week ended March 22, from 96,661,000 to 95,589,000 barrels, as consumption continued large. The latter quantity was nearly 7,500,000 barrels smaller than that of 102,951,000 barrels on hand at the corresponding time last year.

Crude oil stocks in the United States totaled 264,304,000 barrels on March 15, the bureau reported. Since the beginning of this year, the crude inventory has been increased about 3,000,000 barrels.

Humble Advances Crude 6-7 Cents

A general marking up of crude oil prices in the Mid-Continent was promised late last week when Humble Oil & Refining Company, largest buyer in Texas, issued a new bulletin providing for an advance in prices on an average of between 6 and 7 cents per barrel.

That company purchases crude in New Mexico and all districts of Texas, and the revisions of prices, effective March 29, affected virtually all those areas.

The company's action was regarded as highly significant, as other purchasers frequently in the past have generally adopted postings initiated by Humble.

In connection with the new price bulletin, the company pointed out that it was advancing prices of certain crudes and undertaking to adjust certain inequities in the market value of the various crudes.

Gasoline Improves Further; Other Products Also Firm

Further improvement of the gasoline market occurred last week, as evidenced by additional advances of ⅛ to ¼ cent a gallon in quotations by refiners of the Gulf Coast and the Mid-Continent, while prices were steady or tending to improve in most of the marketing areas.

Heavy fuel oils also showed price advances, particularly in the Middle West, as stocks were further diminished in response to continued strong demand.

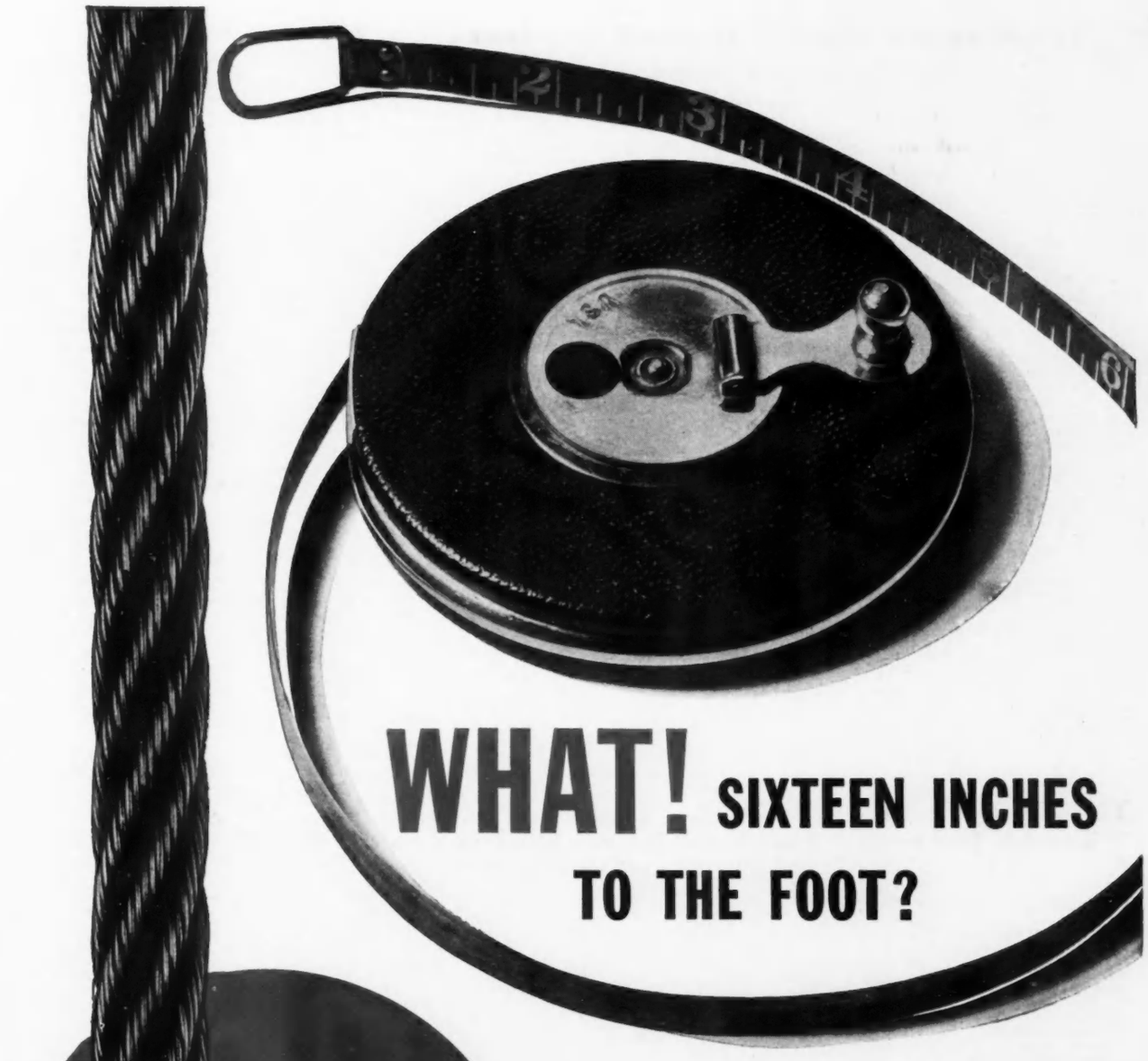
Lubricants likewise continued in strong market position, and prices were marked up by some refiners in the

Trends of Operations and Changes in Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1938:						
November 12	3,243,250	3,180,000	273,394,000	[6]67,551,000	34,175,000	120,491,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,687,000	32,068,000	118,711,000
1939:						
April 22	3,526,700	3,280,000	277,156,000	[2]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[5]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
September 30	3,658,200	3,560,000	233,023,000	71,168,000	38,081,000	115,466,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[2]3,650,000	[2]229,127,000	72,122,000	39,358,000	115,060,000
October 28	3,498,500	3,520,000	230,453,000	72,660,000	39,562,000	114,786,000
November 25	3,818,100	3,510,000	231,811,000	75,595,000	38,527,000	112,106,000
December 30	3,545,000	3,445,000	237,742,000	80,985,000	34,184,000	106,680,000
1940:						
January 27	3,611,600	3,470,000	237,339,000	87,914,000	27,407,000	103,015,000
February 24	3,732,100	3,490,000	240,836,000	96,719,000	25,390,000	103,419,000
March 30	3,841,250	3,585,000	250,561,000	101,370,000	23,778,000	105,081,000
April 20	3,858,550	3,535,000	254,881,000	[1]102,817,000	24,779,000	103,323,000
April 27	3,845,250	3,555,000	256,670,000	102,452,000	24,997,000	102,552,000
May 25	3,835,650	3,580,000	259,330,000	100,297,000	28,356,000	104,015,000
June 22	3,846,450	[1]3,690,000	260,891,000	97,276,000	32,751,000	104,683,000
June 29	3,639,550	3,625,000	262,059,000	95,142,000	33,590,000	104,486,000
July 27	3,690,400	3,555,000	262,579,000	90,173,000	38,981,000	105,924,000
August 31	3,501,350	3,575,000	265,865,000	85,393,000	44,766,000	108,774,000
September 28	3,799,950	3,600,000	263,609,000	82,273,000	47,986,000	108,450,000
October 26	3,640,300	3,565,000	262,746,000	80,891,000	[1]48,893,000	108,475,000
November 9	3,584,200	3,510,000	261,631,000	[6]79,847,000	48,408,000	107,687,000
November 30	3,335,050	3,510,000	262,679,000	80,284,000	46,212,000	106,618,000
December 28	3,385,500	3,585,000	261,552,000	83,274,000	42,266,000	102,620,000
1941:						
January 25	3,599,100	3,625,000	260,093,000	88,762,000	39,039,000	100,297,000
February 22	3,629,650	3,590,000	261,783,000	95,812,000	34,381,000	98,631,000
March 1	3,632,250	3,585,000	263,176,000	96,917,000	33,725,000	97,510,000
March 8	3,633,450	3,505,000	264,001,000	97,178,000	32,429,000	97,372,000
March 15	3,662,450	3,550,000	264,304,000	98,979,000	31,643,000	96,661,000
March 22, 1941	3,681,050	3,655,000	.....	99,541,000	30,595,000	95,589,000
March 22, 1940	3,871,450	[8]3,551,000	[4]246,762,000	102,286,000	23,587,000	102,951,000
Change in past year	—4.9%	+2.9%	+7.1%	—2.7%	+29.7%	—7.2%

[1] All time peak. [2] Peak for year. [3] Lowest since April, 1922. [4] Stocks, March 16, 1940.
[5] Lowest since October, 1922, due to shut down of six mid-continent states. [6] Lowest for year.
[7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California.
[8] March, 1940, daily average.



WHAT! SIXTEEN INCHES TO THE FOOT?

WICKWIRE ROPE

You'd say it was the greatest buy in the wire rope market.

When you measure the service that every twelve inches of Wickwire Rope gives the user in comparison with accepted standards, you find Wickwire offers sixteen, eighteen, yes and twenty-four inches and more in value for every twelve inches of rope you pay for.

Why?... Wickwire Spencer has never been satisfied that standard specifications are the goal of quality. Better metallurgy, more careful manufacture, honest recommendations as to construction to suit the use and valuable information as to care of rope have all contributed in giving Wickwire Rope longer life. Specify Wickwire Rope the next time you order.

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

Wholesale Prices of Refined Products in Principal Markets

	Range Last week (Cents a gal.)		Changes from week Before	
REFINED GASOLINE				
Oklahoma Refineries:				
60 Octane and under	3¾	4¼	...	...
63-66 Octane	4⅛	4½	+⅛	...
72-74 Octane	4½	5	+⅛	...
Mid-Western Tank Car:				
60 Octane and under	3¾	4⅛	...	...
63-66 Octane	4	4½	...	...
72-74 Octane	4⅝	5	...	...
New York Harbor:				
68-70 Octane	5¾	5¾	...	...
72-74 Octane	5¾	6	...	...
Gulf Coast:				
60 Octane unleaded	4⅜	4½	+⅛	+⅛
65 Octane unleaded	4¾	4⅞	+½	+⅛
72-74 Octane leaded	4¾	5⅛	+¼	+¼
NATURAL GASOLINE				
Grade 26-70:				
F.O.B. Group 3	2¾	2¾	...	...
F.O.B. Breckenridge ,Tex.	2⅜	2⅜	+⅛	+⅛
KEROSENE				
Oklahoma Refineries:				
41-43 water white	4	4¼	...	...
42-44 water white	4¼	4⅜	...	...
Mid-Western Tank Car:				
41-43 water white	4¼	4¼	...	...
42-44 water white	4¼	4⅜	...	...
New York Harbor	4⅜	4⅜	—⅛	—⅛
RANGE OIL				
At Oklahoma Refineries	3⅞	4⅛	...	...
In Mid-Western Market, Group 3, basis	3⅞	3⅞	...	...
LIGHT FUEL OILS				
Oklahoma Refineries:				
No. 1 straw	3⅜	3¾	...	+⅜
No. 3	3¼	3⅜	...	...
Mid-Western Tank Car:				
No. 1 white	3¾	4	...	...
No. 3	3⅛	3⅜	—⅛	...
New York Harbor:				
No. 1	4¾	4¾	—⅛	—⅛
No. 3	4	4	...	...

	Range Last week (Per Bbl.)		Changes from week Before	
HEAVY FUEL OILS				
Oklahoma Refineries:				
No. 6	$0.65	$0.65	...	...
Mid-Western Tank Car:				
No. 5	.75	.85	...	...
No. 6	.66	.65	+.05	+.05
New York Harbor:				
No. 5	1.55	1.55	...	...
No. 6	1.25	1.25	...	...
BUNKER C FUEL OIL				
(Per barrel, ships' bunkers)				
Gulf Coast	$ .80	$ .85	...	...
New York Harbor	1.25	1.25	...	...
DIESEL OIL				
(Per barrel, ships' bunkers)				
Gulf Coast	$1.35	$1.50	...	...
New York Harbor	1.65	1.65	...	...
Los Angeles Basin, 27 gravity	1.15	1.20	—.05	—.05
LUBRICATING OIL				
(Cents a gal.)				
Oklahoma Refineries:				
Bright Stock, 150 - 160 viscosity at 210°, 10-25 pour test	13	15½	...	...
Neutral oil, pale No. 3 color, 150 viscosity at 100°, 0-10 pour test	8	10¼	...	...
Western Pennsylvania:				
Bright Stock, 145-155 viscosity at 210°, 25 pour test	15	15	+1	...
Neutral Oil No. 3 color, 150 viscosity at 70°, 25 pour test	20	21	...	...

Mid-Continent and in Western Pennsylvania.

Light fuel oils, in contrast, have been further reduced in price by some refiners and resellers, in reflection of the waning of the season of large consumption and of the present relatively large inventories on hand. Also marked down were kerosene on the Atlantic Coast and diesel oil on the Pacific Coast.

Effective March 26, Standard Oil Company (New Jersey) advanced its tank car prices for unbranded gasoline at New York and Philadelphia and at southern seaboard points ⅛ to ¼ cent a gallon.

Also effective March 26, Socony-Vacuum Oil Company advanced tank car prices of its regular grade gasoline 3/10 to ½ cent a gallon at its terminals throughout New York and New England, except western New York state. The company announced at the same time that it also would adjust dealer tank wagon prices in accordance with local conditions.

Several Mid-Continent refiners early last week advanced their quotations on gasoline, as shipments continued heavy while stocks were comparatively low. Minimum prices at which supplies could be obtained, consequently were ⅛ to ⅜ cent a gallon higher than 10 days previously.

In the Chicago district, likewise, refiners and tank car marketers encountered strong demand for all grades of gasoline, and some plant owners advanced their quotations ⅛ to ¼ cent a gallon. Interest extended to straight run gasoline, which was bought for

Texas Increase Boosts United States Crude Oil Production

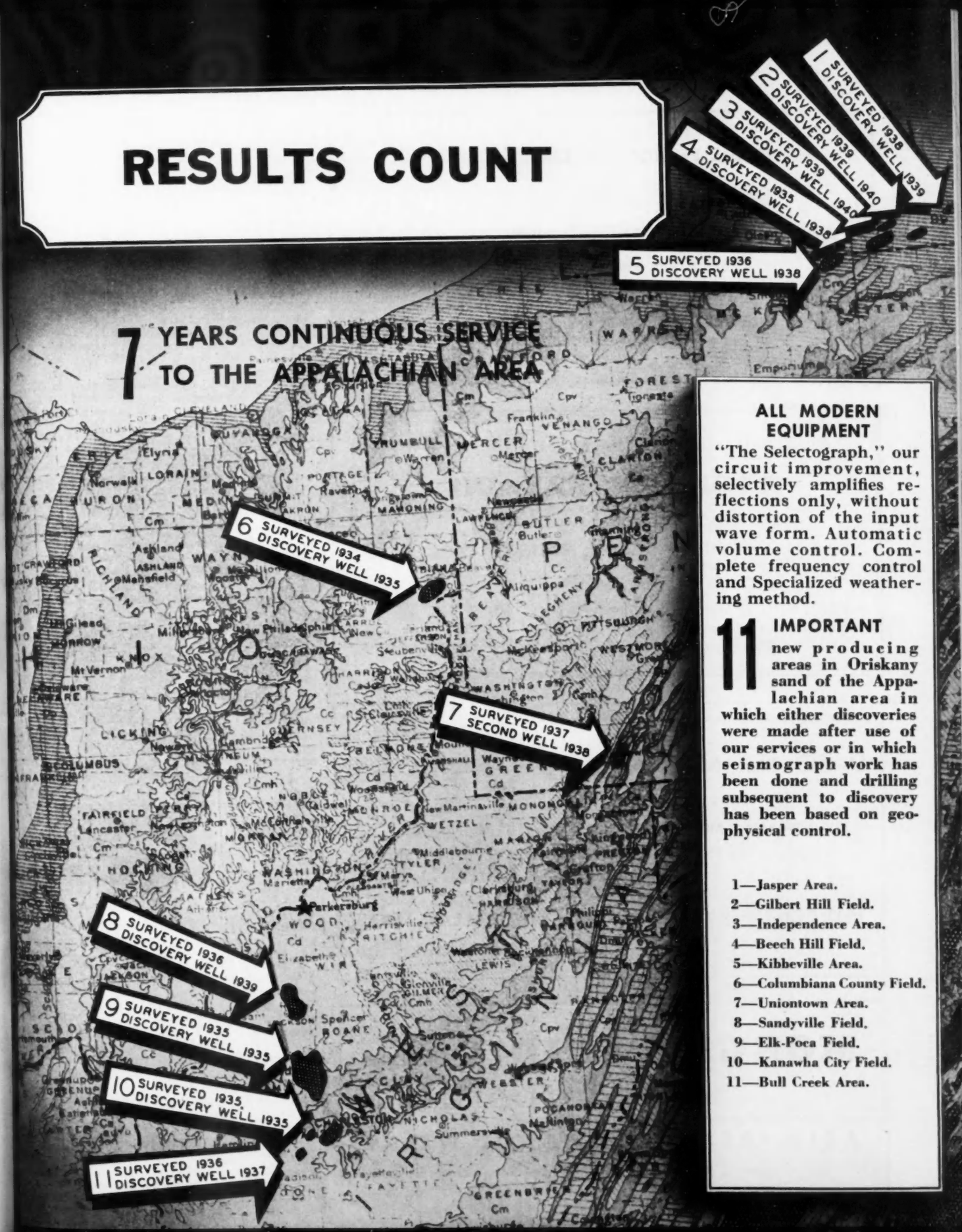
Estimates Compiled by The OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (March)	State Allowable (Barrels Daily in in Mar.)	BARRELS DAILY FOR WEEK ENDED Mar. 22	Mar. 29
TEXAS				
Texas Panhandle	.....	.....	76,700	76,700
North Texas	.....	.....	102,400	102,200
West Central Texas	.....	.....	30,500	30,500
West Texas	.....	.....	241,300	242,100
East Central Texas	.....	.....	78,200	78,300
East Texas Field	.....	.....	374,500	443,800
South Texas	.....	.....	210,400	209,600
Texas Gulf Coast	.....	.....	255,100	255,900
Total Texas	1,327,400	1,305,152§	1,369,100	1,439,100
CALIFORNIA—				
Long Beach	.....	.....	42,400	41,600
Midway-Sunset	.....	.....	46,600	40,900
Kettleman Hills	.....	.....	42,100	38,700
Wilmington	.....	.....	81,200	82,400
Others	.....	.....	406,500	403,300
Total California	596,400	571,500*	618,800	606,900
OKLAHOMA—				
Oklahoma City	.....	.....	93,350	90,700
Seminole Area	.....	.....	102,150	106,650
Others	.....	.....	206,650	211,900
Total Oklahoma	437,400	400,000	402,150	409,250
ILLINOIS—				
Salem	.....	.....	104,400	102,400
Louden	.....	.....	66,500	66,000
Centralia	.....	.....	13,000	12,900
Other New Pools	.....	.....	130,200	138,800
Old Pools	.....	.....	11,600	10,900
Total Illinois	335,200	.....	325,700	331,000

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (March)	State Allowable (Barrels Daily in in Mar.)	BARRELS DAILY FOR WEEK ENDED Mar. 22	Mar. 29
LOUISIANA—				
North Louisiana	.....	.....	70,100	70,600
South Louisiana	.....	.....	234,500	234,800
Total Louisiana	291,300	306,190	304,600	305,400
KANSAS	194,200	194,200	216,000	211,650
NEW MEXICO	103,900	110,000	109,200	109,500
EASTERN STATES—				
Pennsylvania Grade	48,100	.....	70,700	68,800
Others, Eastern	48,400	.....	20,100	20,000
Total Eastern States	96,500	.....	90,800	88,800
MOUNTAIN STATES—				
Wyoming	83,900	.....	82,500	78,300
Montana	21,900	.....	19,700	18,500
Colorado	3,900	.....	3,600	3,700
Total Mountain States	109,700	.....	105,800	103,500
MICHIGAN	47,700	39,000†	38,800	38,100
INDIANA	22,600	.....	19,300	21,500
ARKANSAS	69,700	69,569	71,200	71,400
MISSISSIPPI	20,300	.....	19,400	18,800
NEBRASKA	3,200	.....	4,250	4,300
‡Total 8 Prorated States	3,068,000	2,995,611	3,129,850	3,191,300
Total United States	3,655,500	.....	3,695,100	3,756,200

* Recommendation of Conservation Committe of California Oil Producers.
† Estimate of actual production under prescribed regulations, which do not fix a definite state total allowable.
‡ Texas, California, Oklahoma, Louisiana, Kansas, New Mexico, Arkansas, Michigan.
§ Texas Railroad Commission's estimate of actual net daily production allowing for usual under-production of 3½ percent under net allowable, which for March is calculated at 1,352,489 barrels daily. However, allowable normally increases as new wells are completed. Under February-March order, most Texas fields were ordered shut down March 2, 8, 9, 16, 22, 23, 29, 30 and 31. Texas Panhandle was ordered shut down March 2, 9, 16, 23 and 31.

RESULTS COUNT


1 SURVEYED 1938 DISCOVERY WELL 1939
2 SURVEYED 1939 DISCOVERY WELL 1940
3 SURVEYED 1939 DISCOVERY WELL 1940
4 SURVEYED 1935 DISCOVERY WELL 1936
5 SURVEYED 1936 DISCOVERY WELL 1938
7 YEARS CONTINUOUS SERVICE TO THE APPALACHIAN AREA
6 SURVEYED 1934 DISCOVERY WELL 1935
7 SURVEYED 1937 SECOND WELL 1938
8 SURVEYED 1936 DISCOVERY WELL 1939
9 SURVEYED 1935 DISCOVERY WELL 1935
10 SURVEYED 1935 DISCOVERY WELL 1935
11 SURVEYED 1936 DISCOVERY WELL 1937

ALL MODERN EQUIPMENT

"The Selectograph," our circuit improvement, selectively amplifies reflections only, without distortion of the input wave form. Automatic volume control. Complete frequency control and Specialized weathering method.

11 IMPORTANT new producing areas in Oriskany sand of the Appalachian area in which either discoveries were made after use of our services or in which seismograph work has been done and drilling subsequent to discovery has been based on geophysical control.

1—Jasper Area.
2—Gilbert Hill Field.
3—Independence Area.
4—Beech Hill Field.
5—Kibbeville Area.
6—Columbiana County Field.
7—Uniontown Area.
8—Sandyville Field.
9—Elk-Poca Field.
10—Kanawha City Field.
11—Bull Creek Area.

THE GEOPHYSICAL COMPANY, INC.

L. ELLIOTT RANDALL, President

GENERAL OFFICES, UNION TRUST BUILDING. LABORATORIES & SHOP, ANN STREET

PARKERSBURG, WEST VIRGINIA

NATIONAL PETROLEUM ENGINEERING CO.

Appraisal of Oil and Gas Properties
Commercial and Taxation

PHILTOWER BUILDING, TULSA, OKLA.

HARRY F. WRIGHT, Appraisal Engineer
Member American Association Petroleum Geologists

Contracting Consulting

ROBERT H. RAY, INC.

Geophysical Engineering

GRAVITATIONAL METHODS

Under Water Gravity Surveys now available

DOMESTIC AND FOREIGN

Gulf Building Houston, Texas

DEGOLYER, MACNAUGHTON AND MCGHEE

APPRAISAL AND MANAGEMENT OF OIL PROPERTIES
CONSULTANTS IN PETROLEUM GEOLOGY AND GEOPHYSICS

1000 CONTINENTAL BUILDING DALLAS, TEXAS

MORGAN ACID
Incorporated

ACID TREATMENT OF OIL WELLS

207 Ellis-Singleton Building Wichita, Kansas

L. C. MORGAN
Petroleum Engineer and Geologist

storage in anticipation of the tractor fuel season.

Natural gasoline also was in better demand last week, and whereas the price of 2¼ cents a gallon previously had been quoted generally for grade 26-70 at Breckenridge, Texas, one refiner was reported at the middle of last week to have advanced his quotation to 2½ cents.

Heavy Fuel Oils Continue Good

Heavy fuel oils remained in good demand, and some advances in quotations were announced. A Gulf Coast refiner increased his quotation for bunker C fuel oil 5 cents a barrel, and a plant owner in the Chicago district raised his quotation for No. 6 fuel oil 7½ cents a barrel.

Lubricants continued strong, and further improvement of prices occurred in the Mid-Continent and Western Pennsylvania refining districts. In the Oklahoma-Kansas area, lubes of all grades were ¼ to 1 cent a gallon higher than in the previous week. Bright stocks were particularly sought in the East, and were quoted ½ cent a gallon higher by several refiners of Western Pennsylvania.

In the latter district, wax also was marked up by some plant owners, and neutral oils were reported scarce.

Although light fuel oils were offered at slightly reduced quotations by some suppliers on the Atlantic Coast, the market has remained generally steady, and in some instances prices tended to improve rather than weaken, particularly in consideration of recent further advances of domestic tanker chartering rates.

Clean boats were extremely scarce last week, and it was indicated that rates might increase further, although they had stabilized temporarily at 50 cents for gasoline, 53 cents for kerosene, and 57 cents for No. 2 heating oil in the movement from the Gulf Coast to points north of Hatteras.

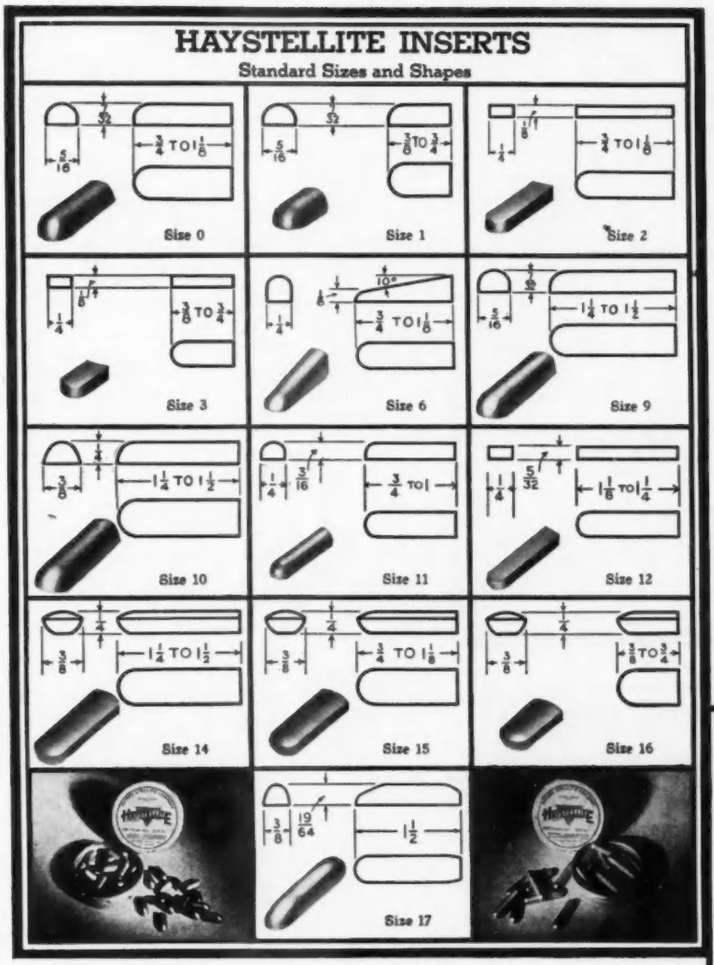
Dirty boats also were not readily available, and rates were 5 cents a barrel higher than a week previously when a boat was chartered on the basis of 48 cents a barrel for 30-gravity or lighter crude and 55 cents for 10-20-gravity fuel oil.

Price Postings on Pacific Coast at Greater Variance

Departing from the prices posted in various California fields by Standard Oil Company of California March 12, Union Oil Company of California on March 22 posted a new schedule covering its purchases which varies on most gravities. Union Oil Company's posting extended the 5-cent per barrel increase previously made by Standard Oil Company in many instances, but held the price at the same level in some fields. In one field, the Union Oil Company posting on crude of 18-gravity was 13 cents a barrel higher than the Standard Oil Company price.

In the San Joaquin Valley, Union Oil Company disregarded the top price of $1.19 a barrel established by the new Standard Oil Company posting and quoted a top of $1.24 a barrel for Greeley and Rio Bravo fields. At Kettleman Hills, Union Oil Company's postings were from 4 to 6 cents under Standard Oil Company's price on gravities ranging from 33 to 37 degrees.

To produce most efficient drilling tools—
use Haystellite Inserts and Tube Rod



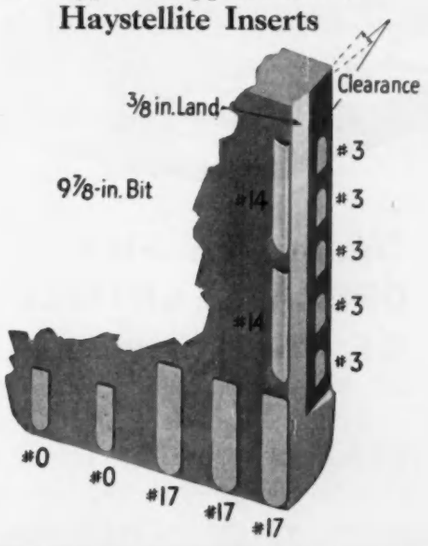
GOOD bits, correctly set with Haystellite inserts and faced with Haystellite tube rod, can be depended upon to make more footage of straight, out-to-gauge hole per round trip.

Haystellite cast tungsten carbide inserts are *hard* enough to withstand severe abrasion, and *tough* enough to withstand shocks. And to assure uniform performance, every Haystellite insert is rigidly inspected before it leaves the factory.

There is a size and style of Haystellite insert for every type of bit, as shown at the left. And Haystellite tube rods are available in 5 tube diameters and 8 different standard screen sizes of tungsten carbide particles.

For the most outstanding drilling performance and the lowest drilling costs, standardize on Haystellite inserts and tube rod for hard-setting and hard-facing all of your drilling tools!

A Typical Application of Haystellite Inserts



Haynes Stellite Company ***can help you.*** The slight extra care required to make each drilling tool the *best* it can be made is more than repaid by more dependable performance and lowered drilling costs. We have the experience and the organization to help you use Haystellite products to obtain best results at lowest cost. Call on us, without obligation.

HAYSTELLITE TRADE MARK
Cast Tungsten Carbide Diamond Substitute

HAYNES STELLITE COMPANY
Unit of Union Carbide and Carbon Corporation
General Office and Works: Kokomo, Indiana
UCC
Foreign Sales Department: New York, N. Y.

The words "Haystellite" and "Haynes Stellite" are registered trade-marks of Haynes Stellite Company.

WORLD-WIDE DEVELOPMENTS

Colombia

Deepest Test Drilled in Colombia Ends in Failure

Shell Oil Company has abandoned its Puerto Parra wildcat in Colombia after carrying it to 10,929 feet and establishing a depth record for the country.

Compania Colombiana de Petroleo El Condor was preparing location for Casabe 1, in marshy lands in the Barrancabermeja area. It will be the first test in the State of Antioquia.

Colombian Petroleum Company, operating 13 rigs, completed 8 new wells and drilled 4906 feet during January. The company's production during the month totaled 358,419 barrels, of which 337,707 barrels were delivered to pipe line. Refined output for the month was 5930 barrels, while exports totaled 96,853 barrels.

Exports of Tropical Oil Company during January totaled 1,283,655 barrels, while refined production totaled 277,328 barrels. The company was operating three rigs.

Colombian Oil Men Have Plan to Organize Institute

A committee of Colombia oil men has been appointed to make preliminary plans for organization of a Colombian Petroleum Institute, patterned after the American Petroleum Institute. Talked intermittently since 1938, formation of the institute is expected to aid in clarifying many problems and provide a means of cooperation between groups in the industry.

Bolivia

Bolivian Congress Continues Wrestle With Expropriation

A marked difference of opinion has characterized deliberations of the Bolivian Congress in the course of efforts to solve the controversy between the government and the Standard Oil Company of Bolivia in a manner that would enable Bolivia to secure a $10,000,000 loan from Washington.

During debates in the senate at La Paz several speakers questioned the wisdom of the government's attitude, which so far is hostile to American participation in the country's oil industry. The view was expressed that the unfriendly attitude toward Standard Oil Company of Bolivia, and centralization of Bolivian oil development in the hands of the governmental agency, Yacimientos Petroliferos Fiscales Boliviano, is preventing the desired rapprochement between Bolivia and the United States.

Last week, according to press dispatches from La Paz, there was introduced into the Bolivian senate a resolution authorizing the government to seek an agreement with the Standard Oil Company (New Jersey), parent company of Standard Oil Company of Bolivia. Foreign Minister Alberto O. Gutierrez is represented as strongly opposed to any agreement that would lead to reconsideration of the issues between the government and the oil company, and would restrict any remuneration given the company to a mere settlement of accounts "without the character of indemnification."

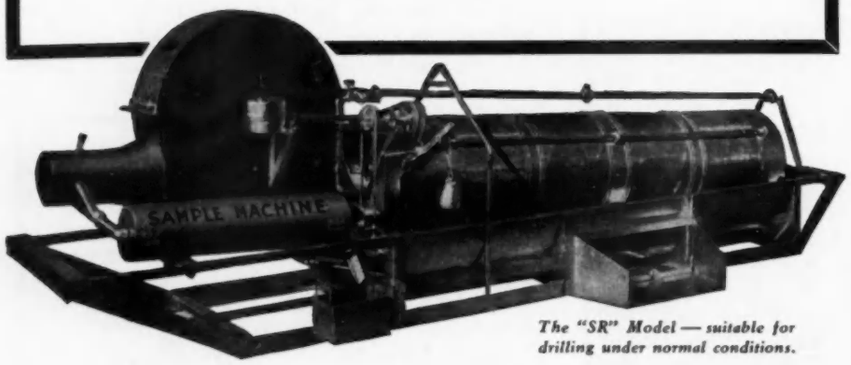
As reported from Buenos Aires, the Bolivian government petroleum agency recently compared Bolivian crude production in 1936, the year before confiscation of the company's properties, with production under governmental auspices in 1940. The figures cited are, in barrels:

	Camiri	Sanandita	Total
1936	45,500	57,200	102,700
1940 (Jan.-Oct.)	86,500	133,800	220,300

The 1940 figures seem excessive. On January 27, 1941, THE OIL WEEKLY showed a preliminary estimate of the total production in Bolivia in 1940 to be only 110,000 barrels. Late last December, another source estimated the total Bolivian production at 101,000 barrels.

At any rate, comparison between 1936 and 1940 production is to be subjected to qualifications. In 1935, during Standard Oil Company's operations in Bolivia, the country's crude output reached 164,000 barrels, one and one-half times the output in 1933. This increase was achieved in spite of difficulties created

Reconditions Mud . . . and Provides TRUE Samples of all Cuttings!



The "SR" Model — suitable for drilling under normal conditions.

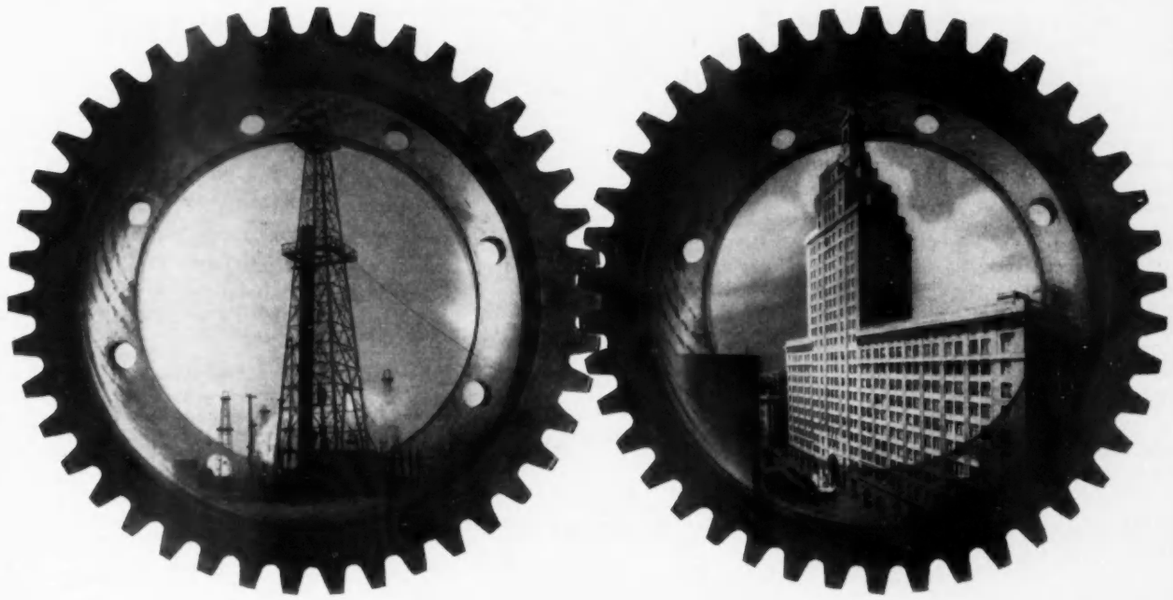
Thompson **SHALE SEPARATOR OPERATES ENTIRELY FROM FLOW OF MUD** **Drilling Contractors** like it, because it is the most economical and satisfactory method of removing shale from mud. **Geologists** like it, because it provides TRUE, clean samples of cuttings, permitting foot by foot analysis when desired. Available in three different models to meet every drilling requirement. Ask — now — for complete details!

Manufactured by

THOMPSON TOOL CO., INC.

Sold Through Supply Stores Everywhere

Phone 3521 Iowa Park, Texas



Geared TO SERVE

Out of our experience gained from long and intimate association with the oil industry, we have learned how best to meet your financial needs— to render a more intelligent, helpful service to you.

NATIONAL BANK OF TULSA

The Oil Bank of America

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

by the Chaco war. Also, it should be pointed out that 1936 was the year when, as the result of governmental action, the company's production was forced down, reaching a low level in December of that year.

Another subject of discord in the arguments in the Bolivian senate is the presence of Argentinian influence in the petroleum situation in Bolivia. There has been close contact between the Argentine government oil agency, Yacimientos Petroliferos Fiscales, and the Bolivian Y.P.F. A report from Buenos Aires declares that Argentine government representatives have agreed to grant the Y.P.F.B. a credit of 2,000,000 pesos (approximately $450,000) and some other facilities to build a railroad linking the Bolivian oil fields with the Argentine state railway system.

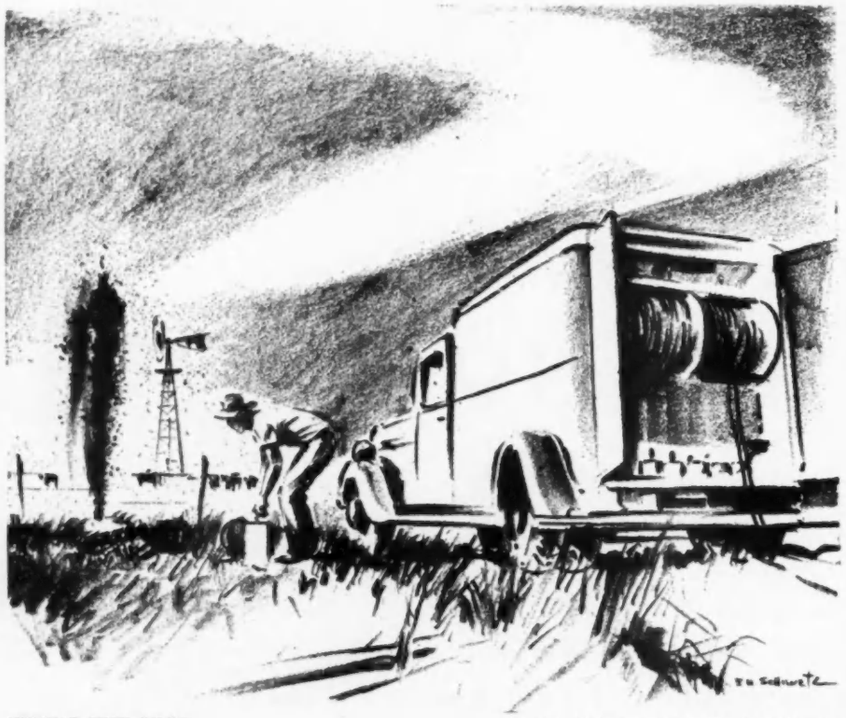
Venezuela

Venezuelan San Joaquin Area Test Drilling Below 5700 Feet

On March 18, Socony-Vacuum Oil Company was drilling Guario 3, in the San Joaquin area of eastern Venezuela, at 6177 feet with a steam rig. A diesel rig had been used in drilling to 5738 feet. This test will explore sands down to about 10,000 feet.

The company's Guario 4, in the same area, was drilling at 3320 feet, projected to sands around 7200 feet. Guario 1 and 2 were closed in, but were being produced intermittently for fuel purposes.

The company's wildcats, Anaco 1 and Panchita 1, were being drilled in the Roble area and Anzoategui state. Two weeks ago, Anaco 1 was drilling in shale at 8692 feet. It is a deep test to explore sands found in wells of the Roble region. Panchita 1 was coring at 2925 feet, following an electric log. It will explore the Oficina formation in the tar belt.



FIRING THE SHOT — from a lithograph by E. M. Schiwetz

THE FIRST NATIONAL BANK in Houston extends a hearty welcome to visitors to the annual Geological-Geophysical Convention to be held in Houston April 1 through April 4.

Located in the "Oil Capital of America," we have developed our facilities for the oil man's service through a happy association with many large and small corporate and individual oil accounts. As a consequence, we feel that we are thoroughly familiar with the oil man's banking needs, and that the comprehensive banking service we render is useful and valuable to him . . . on this basis, we suggest—*make the First National your bank.*

FIRST NATIONAL BANK
IN HOUSTON

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Argentina

Continued Nationalistic Policy In Villafane's Appointment

Continuance of nationalistic policies is seen in Argentina by appointment of a new director, Dr. Benjamin Villafane, to the governmental oil agency, Y.P.F. When he became president of the province of Jujuy in 1924, Villafane caused cancellation of a large number of oil concessions, reported at 385, which had been granted to private companies, and impelled the Leach interests to surrender their concession.

The Y.P.F., enjoying governmental support and the advantages of a national policy unfavorable to private oil operations, has appreciably increased its production, reported for the past five years, in barrels, as:

	Y.P.F.	Private	Total
1936.....	7,150,000	8,245,000	15,395,000
1937.....	7,910,000	8,375,000	16,285,000
1938.....	8,960,000	8,040,000	17,000,000
1939.....	10,190,000	8,350,000	18,540,000
1940.....	12,424,000	8,098,900	20,522,900

The following figures show the distribution of 1940 production by districts, quantities being in barrels:

District	Y.P.F.	Private
Comodoro Rivadavia....	8,430,000	6,477,500
Mendoza	2,505,000	.....
Plaza Huincul	674,000	597,000
Salta	815,000	1,024,000

Of Comodoro Rivadavia district private company production, 4,185,000 barrels was by Diadema; 1,398,000 barrels by Ferrocarrilera, and 894,500 barrels by Astra. Of Plaza Huincul district private company production, 401,000 barrels was by La Republica and 196,400 barrels by Standard Oil Company. All Salta district private company production was by Standard Oil Company.

Because production in the Mendoza district in 1940 more than doubled that of 1939, the total output of crude in Argentina during 1940 was 11 percent greater than in 1939. In the same period, the output of crude by the Y.P.F. increased 22 percent over what it was in 1939, although in 1940 the Y.P.F. production data included the output of the Rio Atuel Company, now under Y.P.F. management. In the Plaza Huincul district, Y.P.F. has acquired Astra.

Chile

Report Germans Negotiating For Chilean Exploration

Last week, a press dispatch from Santiago, Chile, declared German interests have made offers to the Chilean government to undertake explorations for oil. The government is currently considering offers of an American company in which Herbert Hoover, Jr., is said to be interested. Hoover had no comment to make on the dispatch. Attaches of the Chilean consulate in New York declared they knew nothing of the German offers and were not informed as to the identity of the German group.

CHINA 136 A·D·

'IN THE FIRST YEAR OF YOKA,

A. D. 136, a Chinese called Choko invented the seismometer shown in the accompanying drawing. This instrument consists of a spherically formed copper vessel, the diameter of which is eight feet. It is covered at its top, and in form resembles a wine-bottle. Its outer part is ornamented by the figures of different kinds of birds and animals, and old peculiar-looking letters. In the inner part of this instrument a column is so suspended that it can move in eight directions. Also, in the inside of the bottle, there is an arrangement by which some record of an earthquake is made according to the movement of the pillar. On the outside of the bottle there are eight dragon heads, each of which holds a ball in its mouth. Underneath these heads there are eight frogs so placed that they appear to watch the dragon's face, so that they are ready to receive the ball if it should be dropped. All the arrangements which cause the pillar to knock the ball out of the dragon's mouth are well hidden in the bottle.'

'When an earthquake occurs, and the bottle is shaken, the dragon instantly drops the ball, and the frog which receives it vibrates vigorously; any one watching this instrument can easily observe earthquakes.'

'Once upon a time a dragon dropped its ball without any earthquake being observed, and the people therefore thought the instrument of no use, but after two or three days a notice came saying that an earthquake had taken place at Rosei. Hearing of this, those who doubted the use of this instrument began to believe in it again. After this ingenious instrument had been invented by Choko, the Chinese Government wisely appointed a secretary to make observations on earthquakes.'

EARTHQUAKES ***by John Milne, F.R.S., F.G.S.***

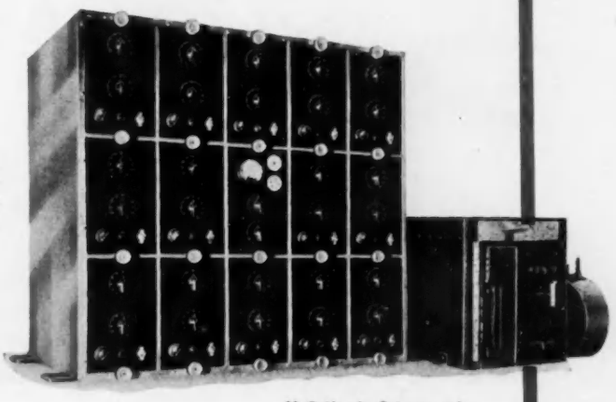
Choko's Seismograph

U·S·A· 1919 A·D·

McCOLLUM PIONEERED IN THE SCIENCE OF

seismic exploration for petroleum structures . . . and has continued through 22 years of operation

Eminently Successful



McCollum's Seismograph Amplifier and Recorder

McCOLLUM SINCE 1924

Exploration Company

Esperson Building **Houston, Texas**

What's the use of a well survey that gives the wrong answer?

There's always an important reason for making a survey. And for that same reason, a false record in a deep hole may prove very costly.

Why take chances?

You can't get a false record with the Surwel Clinograph. It provides two sets of records—one going in and one coming out. The results comprise a continuous closed traverse that positively verifies the accuracy of the survey . . . offering a **double-check** for efficient drilling.

√ DOUBLE-CHECK YOUR SURVEYS USE THE • • • •

• • • SURWEL CLINOGRAPH

SPERRY-SUN WELL SURVEYING COMPANY

1608 Walnut Street, Philadelphia, Pa.

Houston, Tex. • Corpus Christi, Tex. • Lubbock, Tex. • Long Beach, Calif.
Bakersfield, Calif. • Lafayette, La. • Fort Worth, Tex. • Oklahoma City, Okla.

U. S. FIELD OPERATIONS

Illinois-Indiana

Posey Wildcat Promises 150 Barrels from Aux Vases

Showing for an estimated 150 barrels initial in the Aux Vases sand was a Posey County wildcat two miles west of Griffin, Cherry-Kidd-Arrow Drilling Company et al's Pocket Realty Company 1, NW NE NW 2-4s-14w. Aux Vases at 2846-81 feet was shot with 100 quarts, and swabbed about 230 barrels of fluid with some water in 24 hours. Same operators located Pocket Realty Company 2, NE NE NW.

In Black Township, Posey County, Gulf Refining Company was spudding William Fred Schreiber 1, SE NE SE 23-6s-13w, wildcat start near Buffin. Parker Drilling Company is contractor.

Pumping about 150 barrels of fluid a day, nearly three-fourths water, was North Central Oil Company-Miller's Oakland City College 2, SE NE SW 16-8s-14w, Neiderst pool of Point Township, Posey County. First McClosky test in the field, it is producing from two breaks, at 2624-27 and 2670-83 feet. Each break was acidized with 4000 gallons.

Still waiting on cement with casing set to McClosky was an attempted ½-mile north extension of the Neiderst pool, Roger Bauman's Ritter 1, SW SW SE 9-8s-14w.

Waiting on electric survey to determine possibilities of 12 feet of Cypress saturation was a Gibson County wildcat east of Griffin field production which was dry in the McClosky at about 2850 feet, W. G. Turbeville's Sam Heston 1, NE NE SE 8-3s-13w.

Kentucky Grayson Wildcat

In Grayson County, eight miles east of Litchfield, Sun Oil Company located George Woods 2, wildcat 900 feet south of Woods 1, abandoned recently in the Knox dolomite at 3770 feet, deepest test ever drilled in this part of Kentucky. Miller & Shiarella, Owensboro, are contractors.

Drilling at 200 feet was a new wildcat start near Boling Chapel, Sohio Corporation-W. E. Hupp's Osia Boling. It will be cable-tooled to McClosky at about 980 feet.

In Henderson County, a mile south of Sebree, J. R. Powell was moving in cable tools for a 1400-foot test on the C. Eastwood lease, Section 22-N-21.

New White County Pool May Be Year's Best

White County's newest oil field, now two weeks old, may be one of 1941's most important discoveries. Its second completion, Benedum-Trees' Bail 1, NW NW SE 19-7s-11e, added prestige to the area when it flowed 281 barrels in 16 hours from Tar Springs sand at 2109-21 feet through open casing. The test, an offset to the same operators' discovery well, was to be tubed and promised completion as a flowing well. The company's Stinson 2, SE SW NE 19-7s-11e, another discovery offset, was drilling plug, and has given every indication of being an excellent producer.

A wildcat 11 miles west of Centralia in Clinton County, J. F. Ashoff, Jr.'s Lampen 1, W½ NW NW NW 16-1n-2w, was estimated to be a 50-barrel producer although official production figures never have been released since the well was put on pump. It is producing from Cypress pay at 1105-08 feet, and is eight miles from production. East of the discovery ½ mile, B. E. Martin's Brinkman 1, SE 9-1n-2w, had a fishing job at 1060 feet. At an elevation of 422, Brinkman 1 topped Glen Dean at 938 feet. It was being drilled with cable tools.

Clinton County was the scene of another flurry of wildcat drilling. Near Shattuc, Hughes Petroleum Company's B. B. Hohman 2, NE SW SE 10-2n-1w, was drilling at 1270 feet. Northwest of Sandoval, Obering & Phillips, discoverer of two fields recently, was drilling at 1622 feet for a wildcat Devonian test, Yantis 1, Section 27-3n-1w, farmout from Adams Oil & Gas Company, after topping Benoist at 1436 feet.

Two important wildcats were due for immediate drilling in the northeast part of Marion County, both by Swan-King Oil Company, Williams 1, SE NE SE 26-4n-2e, and Martin Cemetery 1, SW SW SE SW 36-4n-2e.

In the county's Tonti field, Romine's Varde 1, SW NE 33-3n-2e, first Trenton test in the pool and first Trenton operation in the county to be drilled from the surface, was coring Devonian at 3592 feet. Best Trenton completion in the Lake Centralia-Salem field during the week was Texas Company's Hayes 8, E½ NW NW 32-2n-2e, which flowed 294 barrels in 24 hours.

First Devonian operation in the McKinley field of Washington County, Joe Murphy's Fee 2, NW NW NE 29-3s-4w, was drilling at 2250 feet. At an elevation of 537 feet, the test topped Glen Dean at 672 and Benoist at 987 feet. The Benoist, only productive formation in the pool to date, was dry.

The Pure Oil Company was preparing to drill plug at T. R. Michels 1, W½ SW NW 25-2n-7e, a mile north of the West Enterprise pool in Wayne County, where saturation was recovered in McClosky lime and hole bottomed at 3065 feet. Drill-stem test showed 25 feet of free oil, 60 feet of mud and oil, and no water.

Oklahoma

Prue Sand Opened in East Stroud Pool, Creek County

Lewis Production Company proved initial Prue sand pay in East Stroud pool, Creek County, at Jones 1, NW NE SW 32-15n-7e, two locations southeast of Wilcox-sand production. Plugged back from dry Wilcox sand at 4055-4102 feet to 2850 feet, Prue sand was shot with 80 quarts at 2820-34 feet. After cleaning out in several large flows over the crown block, flow averaged eight barrels the first hour and 60 barrels the first 10 hours to establish a potential of 144 barrels daily. Gas volume is estimated at 2,500,000 feet. All previous wells in the pool showed possibilities in Prue sand, but were completed in Wilcox sand without testing upper horizons. Summit Drilling Company had contract for the new discovery in Prue sand.

Arbuckle lime was dry and caving hole prevented deepening at Superior Oil Company's Osage 2, NW SE SW 23-22n-8e, wildcat southwest of Hominy pool. Oswego lime was at 2086-2151 feet, Pink lime 2254-62 feet, Redfork 2264-2412 feet, Bartlesville 2457-68 feet, Mississippi 2620-2853 feet, top Tiner 2858 feet, Hominy 2900-71 feet and Arbuckle lime 2971-3078 feet. Hole will be plugged back and two small oil shows in Hominy sand will be tested before abandoning.

Skelly Oil Company completed the initial oil producer in West Okemah gas-distillate pool, Okfuskee County at Wesley 1, SWc NW 21-11n-9e, flowing 393 barrels of oil and 720 barrels of water in 24 hours through 1-inch tubing choke. Hunton lime was topped at 3955 feet, and hole bottomed at 4047 feet. Pay was treated with 1000 gallons of acid.

Portable Drilling Company and K. G. F. F. Oil Company's Camp 1, SWc 6-11n-9e, Okfuskee County strike, flowed 192 barrels of oil in 24 hours through a 5/64-inch tubing choke. Gas was estimated at 1,000,000 feet. Hunton lime was perforated with 41 holes at 3950-60 feet.

Forest City Basin

Fourth Wildcat Starts in Iowa Section of Basin

In Oskaloosa pool of Jefferson and Leavenworth counties, northeastern Kansas, Dan McLaughlin & Sons were moving in materials for Bartlett 1, C SW SW 33-9s-20e, and McLaughlin & Young were drilling McLeod 2, NWc SW 4-10s-20e, below 500 feet.

Caufield and Sullivans et al's Ragan 1, SWc SE 19-10s-20e, bailed a gallon of black oil per hour with a small show of water at 1619-24 feet in Mississippi lime, topped at 1565 feet. Six-inch pipe was cemented at 1545 feet and hole cleaned out to 1645 feet. A show of oil was logged in Burgess sand at 1545-50 feet. McCain & Sherrod et al's Green 1, SWc NW 9-11s-19e, was under-reaming 6-inch casing at 1537 feet, two feet in Mississippi lime.

The Ohio Oil Company entered the Iowa play with wildcat location for Wisnom 1, C NW NE 23-68n-41w, eastern Fremont County, Forest City Basin. Contract was awarded Ike Taylor, Centralia, Illinois, for

a Hunton-lime test, or Arbuckle lime should the upper horizon prove unproductive. Extensive core drilling preceded selection of drill site.

Three tests were active in Iowa. Pryor & Lockhart and Stanolind Oil & Gas Company's Marr Estate 1, C E½ NE SW 32-68n-33w, was below 2000 feet; J. B. Barnes et al's Lucas 1, SW NE SE 28-70n-43w, was drilling below 1875 feet, and F. E. Hunt et al's McConnell 1, C SE SE 11-78n-30w, was testing at 1450 feet.

Hearing Postponed

The Texas Railroad Commission has postponed indefinitely a hearing on operating rules for the deeper horizon in the Wasson field, Gaines and Yoakum counties. Applicants failed to appear when the hearing was called on March 25.

Kansas

Swabbing Opens Arbuckle Lime in Stafford Pool

Stanolind Oil & Gas Company opened initial Arbuckle-lime production in Stafford pool, Stafford County, at Charles 4, CNL SW SE 15-24-12w, swabbing 73 barrels of oil per hour for two hours 1600 feet off bottom. Arbuckle lime, topped at 3945 feet, was drilled 10 feet. On a three-hour test 1000 feet from surface, the discovery made 18 barrels hourly without water. Operators continued testing while flow steadily decreased in volume.

Same operator's Billinger 1, C E½ SE SW 15-21-38w, wildcat in Kearny County, topped Topeka lime at 3660 feet, and core recovery at 3724-42 feet showed dense lime with slight porosity. Core at 3742-60 feet showed dead black oil with a small show of water. Good porosity was logged at 3750-58 feet. Hole was being deepened below 3895 feet.

Derby Oil Company, Crow Drilling Company et al's Miller 1, C S½ SW SW 17-13-17w, 2½ miles southwest of Catherine pool, the same distance southeast of Ubert pool, and five miles northeast of Hayes, Ellis County, acidized Arbuckle lime at 3645-53 feet with 500 gallons. The wildcat swabbed 82 barrels of 31-gravity oil in four hours, with no water showing. Two offsets are scheduled by Derby Oil Company and Lion Oil Refining Company, both having interests in the discovery well.

In Cowley County, W. M. McKnab's Miller 1, SW SE NE 15-32-5e, semi-wildcat ½ mile south of gas production and ¾ mile east of Frog Hollow pool, topped Bartlesville zone at 3028 feet, and 5½-inch casing was cemented at 3055 feet. When bit penetrated to 3103 feet, hole filled 450 feet with oil in 18 hours. Operators were preparing to drill plugs and test.

Earl Wakefield et al's Smyres 1, C N½ NE SE 35-19-6w, two miles north of Bornholdt pool, Rice County, drilled plugs in Mississippi Chat to 3336 feet for only a small show of oil with water, and was abandoned. Lime was topped at 3259½ feet, and fair saturation recovered to 3267 feet.

Republic Natural Gas Company's Radenberg 1, C W½ NW SE 8-17-11w, West Kraft discovery, Barton County, pumped 18 barrels of 39.5-gravity oil in nine hours after treating with 670 gallons of acid. Operators were testing for official potential after reacidizing Arbuckle lime at 3318-32 feet with 1000 gallons. Five-inch casing was cemented at 3321 feet.

Alva Billings et al's Ryan 1, C E½ NE SE 27-8-32w, Thomas County wildcat, was cleaning out hole at 4200 feet after encountering a small show of oil at 4120 feet in Topeka lime, topped at 3955 feet. Six-inch casing was landed at 4013 feet.

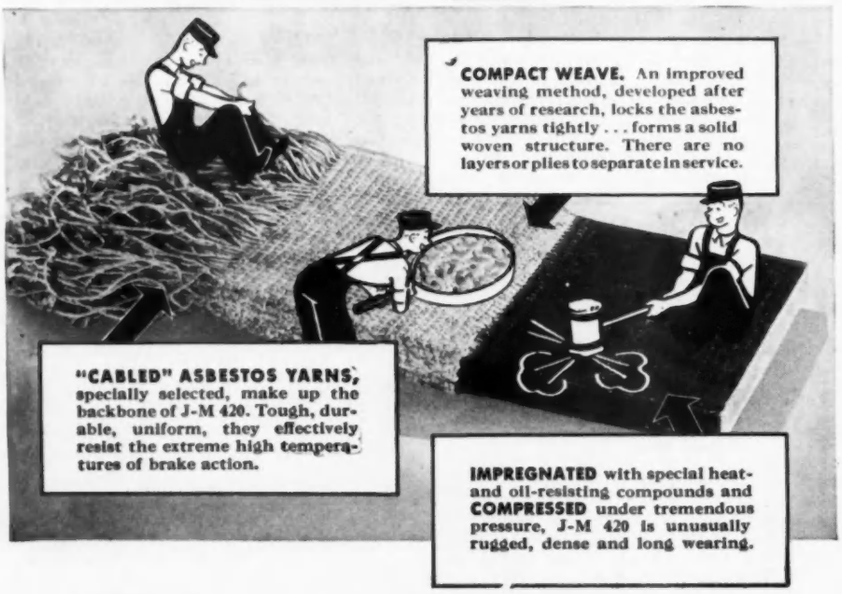
Ask 100-Barrel Allowable For Schwab-Wilcox Field

Peyton Brothers have requested an allowance of 100 barrels daily for welis in the Schwab-Wilcox field, Polk County, and exemption of the field from shut-down orders. The allowable now is 55 barrels per well with shut-downs.

Testimony presented at a hearing before the Texas Railroad Commission last week indicated that the field suffers from erratic pressure changes, and large volumes of water are produced.

JOE BROWN, president of Brown Supply Company, and C. E. Farris, both of Oklahoma City, have organized the F. & M. Drilling Company, which will operate as a drilling and servicing company and acquire leases and develop production.

What makes J-M 420 a Better Rotary Lining?


COMPACT WEAVE. An improved weaving method, developed after years of research, locks the asbestos yarns tightly . . . forms a solid woven structure. There are no layers or plies to separate in service.
"CABLED" ASBESTOS YARNS, specially selected, make up the backbone of J-M 420. Tough, durable, uniform, they effectively resist the extreme high temperatures of brake action.
IMPREGNATED with special heat- and oil-resisting compounds and COMPRESSED under tremendous pressure, J-M 420 is unusually rugged, dense and long wearing.

WHEREVER used, J-M 420 Rotary Lining delivers these four important advantages:

Unusually even feed-off, giving better control of drilling . . .

Higher braking efficiency, even at extreme temperatures caused by heavy loads . . .

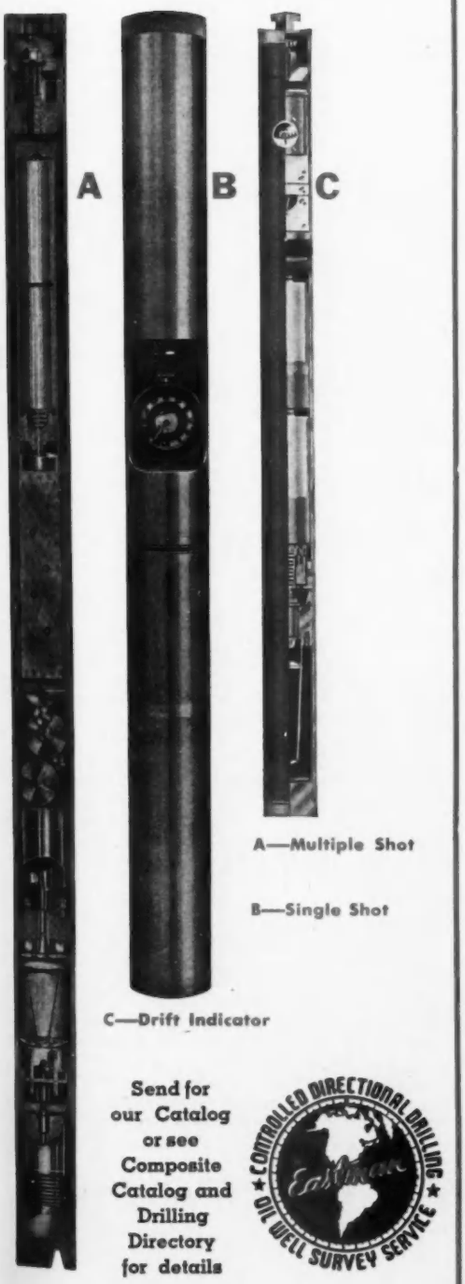
Longer life, under any conditions . . .

Less rim scoring, making drums last longer . . .

In every major oil field in the country, J-M 420 Lining is helping keep braking efficiency high, operating costs low. Owners, operators, drilling crews all agree, "You can't beat it for continued dependable performance on the job!" A tryout on your own rigs will convince you. For details, write for brochure FM-10A. Johns-Manville, 22 East 40th Street, New York, N. Y.

Johns-Manville 420 ROTARY LINING

Use Eastman



A—Multiple Shot

B—Single Shot

C—Drift Indicator

Send for our Catalog or see Composite Catalog and Drilling Directory for details

CONTROLLED DIRECTIONAL DRILLING ★ OIL WELL SURVEY SERVICE ★ Eastman

OIL WELL SURVEYS

to determine

BOTTOM HOLE LOCATIONS —VERTICAL CORRECTIONS

KNOW THE COURSE YOUR HOLE IS TAKING! Know Its Condition for Present and Future Problems! Accurate Geological and Engineering Determinations are Essential. You need the Information Furnished by Eastman!

A MULTIPLE SHOT (Oriented, Magnetic or a Combination of Both) — Survey All Your Well in One Round-Trip.

B SINGLE SHOT (Operated by Drilling Crews) — Used While Drilling Your Well to Determine Drift Angle and Direction.

C DRIFT INDICATOR (Operated by Drilling Crews) — Lowered in Drill Pipe to Determine the Angle Off Vertical Only.

Call Any Office Any Time

EASTMAN OIL WELL SURVEYS

DALLAS • LONG BEACH

HOUSTON • LAFAYETTE • OKLAHOMA CITY

BAKERSFIELD • VENTURA • CASPER

Originators of Controlled Directional Drilling Service
Pioneers of Oil Well Surveys

West Texas

Abell Pool in Pecos County Has 14 Active Operations

Authorization of 4 tests for the Abell pool, Pecos County, involves east outposts and gives the area 14 operations, 8 drilling. The fourth oil producer, an outpost on the west flank, proved a deeper sand for the Simpson series. Magnolia Petroleum Company has authorized an 80,000-barrel tank and will store the allowable of its wells pending the entry of a pipe line. The company is trucking its production to Winkler County. Output of Stanolind Oil & Gas Company's producer is moved by truck to Gulf Refining Company's Monohans station.

Magnolia Petroleum Company's Sharp-State 1, ⅞ mile northwest of a 5409-foot producer, flowed head of 66 barrels of 41-gravity oil via casing in 12 hours, then pumped 40 barrels in 12 hours. Hole is bottomed at 5945 feet with 5½-inch liner at 5870 feet. Magnolia Petroleum Company cleared location for Baldwin-State 2, southwest corner Lot 6, Section 24, and contractor set up rotary to drill J. F. McKee 1, southeast corner lot 13, Section 25, being an east offset to Abell et al's Rixse 1, which is changing to heavy rotary at 2405 feet. Eastland Oil Company's Walsh 1, Lot 11, H&GN Section 25, and Siemoneit Drilling Company's Simmons 1, Lot 12, Section 26, will seek east extensions on short-term leases. Phillips Petroleum Company's Silverman 1, southeast offset to the discovery, was running casing late last week with the hole bottomed at 5585 feet. This outpost logged top of Simpson at 4740 feet and Tulip Creek at 4916 feet, with an elevation of 2393 feet. Saturation at 5118-65 feet promises oil production, but the discovered pay zones were not so encouraging due to shale predominating.

Initial rating of 1242 barrels of 37.5-gravity oil was earned by Gulf Oil Corporation's Waddell et al 17, C E¼ of E¼ H&TC Section 15, Block 3, Crane County, after using 7000 gallons of acid at 5635-48 feet in Ellenberger, topped at 5584 feet. Seven-inch pipe was set low to exclude prolific gas in upper portion of Ellenberger. This move resulted in the gas/oil ratio being held to 2104 feet per barrel. Although the well is 4 miles south of nearest Ellenberger production in the Sand Hills field and 6¾ miles north of the Abell pool, Gulf Oil Corporation will classify it as being an extension to the former.

Revival of oil prospects for the Quito pool, Western Ward County, occurred when Ken Slack et al's Wilson 1, 1½ miles southeast of the discovery gasser, developed free oil with nominal volume of gas from Delaware sand at 5030-34 feet, with an elevation of 2680 feet. Pipe will be run for a production test.

A stray water zone encountered in the pay section by Magnolia Petroleum Company's Wilson 1, SEc Labor 8, League 41, a mile northeast of nearest production in the Hockley County sector of the Slaughter field, places it on the doubtful list, although it occupies favorable structural position. This outpost tested 1 barrel of fluid hourly, 15 percent oil, on swabbing test after injecting 1000 gallons of acid through perforations at 4850-65 feet and 4888-4910 feet, with casing on bottom at 4955 feet. Porosity of the formation is subnormal as a maximum pressure of 1800 pounds was applied by the acid pumps, and pressure broke at 1450 pounds. These perforations were squeezed off, and swabbing resumed through perforations at 4909-29 feet, resulting in an average of 1½ barrels of fluid hourly.

The Slaughter field which embraces portions of 3 counties, has taken the lead over all fields in the Southwest in volume of drilling in recent weeks, and the peak has not been reached. Current field report lists 103 operations, including 64 tests drilling and in process of completion. Sharp gain in drilling will follow deals involving the asisgnment of development rights to the Mallet Land & Cattle Company's unleased acreage in Edwards County School Lands, Leagues 47 and 48. More than a dozen offsets are required on the south border of the acreage. Outlet for unconnected wells in the Hockley County portion of the field has greatly improved since The Texas-New Mexico Pipeline Company placed its Sundown-Midland carrier in service last week, making deliveries to Atlantic Pipeline Company at Midland. South Plains Pipeline Company gathers the oil.

Magnolia Petroleum Company's Teague 1, northwestern Martin County wildcat, was awaiting orders at 6117 feet pending decision as to whether it

IT HAS BEEN FIRST IN OIL FOR FIRST OF TULSA THROUGHOUT THE MID-CONTINENT HISTORY.

THE *First* NATIONAL BANK and Trust Company of Tulsa

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

DU PONT ACCEPTED YOUR CHALLENGE

You said: *"Give us a better blasting agent for Seismic Shooting!"*

Du Pont gave you *"Nitramon" S*

YOU ASKED FOR:

1. *Greater safety.*
2. *A more rigid loading unit.*
3. *Uniform velocity; high strength.*
4. *Resistance to heat, cold and water.*
5. *Economy.*

"NITRAMON" S GIVES YOU:

"NITRAMON" S offers utmost safety. It cannot be detonated by flame, friction, impact, Primacord or the strongest commercial cap. "NITRAMON" S is detonated by a special primer.

"NITRAMON" S is packed in strong metal cans which may be tightly screwed together and thus forming a rigid charge containing the required quantity. Retains rigidity under heavy pressure while loading in deep, mucky holes.

"NITRAMON" S always detonates at the same velocity regardless of the depth of water covering the charge. The strength is equivalent to that of 60% gelatin dynamite.

"NITRAMON" S is not affected by heat. Does not freeze. Being sealed in metal cans, "NITRAMON" S is waterproof if the cans are not broken.

Time is saved in preparing charges of "NITRAMON" S, thereby enabling crews to make more shots per day, and so reducing the over-all cost of seismic prospecting.

For more information about "NITRAMON" S address your inquiries to:

E. I. DU PONT DE NEMOURS & COMPANY (INC.)

Explosives Department . . . Wilmington, Delaware

District Offices: Birmingham, Chicago, Denver, Joplin

Visit our Display at Convention of American Association of Petroleum Geologists April 1-4—Rice Hotel, Houston

DU PONT
REG. U. S. PAT. OFF.

SEISMOGRAPH EXPLOSIVES

will be deepened to the Clear Fork member of the Permian after proving dry in the regular zones. It is the first deep test for the general area, which has experienced considerable lease activity since the first of the year. The company holds lease on a large block, which extends into Borden County.

Some encouragement for oil production from the Clear Fork in the North Goldsmith pool, Ector County, resulted when M. A. Grisham and M. J. Delaney's Cowden 1, C NE SE Section 4, Block 45, swabbed and flowed 15 barrels daily after using 2700 gallons of acid in broken saturation at 5655-5760 feet. The oil zone was mudded off, and drilling was under way at 6250 feet.

Gulf Oil Corporation's Waddell 39, SWc NE PSL Section 14, Block B-23, advanced the prolific sector of the Gulf-Waddell field, Crane County, a mile southwest with a flow of 100 barrels oil hourly on preliminary gauge after using 5000 gallons of acid in broken pay at 3452-3510 feet. The company's University 1-F, Crane County wildcat and the deepest active test in the district, was drilling Simpson at 10,380 feet. It is to continue to the Ellenberger.

HARVEY T. HARRISON, general sales manager of The Duraloy Company since 1937, has been elected vice president in charge of sales. He joined the company in 1928 in the New York office. In 1930 he became district manager at Cleveland where he remained until 1937. He is a graduate of Lafayette College, and his entire business career has been spent in the management end or sale of steel and alloys.

North Texas

Western Cook County Area Will Get Prompt Development

Development of short-term leases of The Texas Company in its discovery block in Western Cooke County will be undertaken as result of its Peter Bindel 1, Lot 1, F. Hughes Survey, producing 85 barrels of oil on 12-hour swabbing test. Production is from broken sand at 1885-96 feet. Pumping unit was being installed late last week. This strike is 4 miles northwest of Muenster. The company has spudded W. H. Endres 1, northwest corner Lot 4, being a short distance south of the discovery, and other locations are pending. Sinclair Prairie Oil Company holds lease on the bulk of the adjoining acreage.

Production test of Ordovician was underway late last week at Shell Oil Company's Coleman 1-A, Clay County, wildcat that passed up possible flowing production from the Mississippian, to explore all known potential oil zones. The initial test will be made of Ellenberger dolomite at 6727-6837 feet, with 5½-inch pipe cemented at 6589 feet. Top of Viola lime was called at 6397 feet and Simpson at 6455 feet. The Viola is seldom present in the district, except to the east. Coleman 1-A likely will be completed through perforations opposite broken lime at 6128-6221 feet in the Mississippian, topped at 6126 feet, as it flowed 44-gravity oil when tester was used. The prospect is in Section 24, Calhoun County School Lands, 7¾ miles southeast of Henrietta.

The Throckmorton County strike by Humble Oil & Refining Company on its J. N. McKnight 4466-acre lease, Section 2, Day Land & Cattle Company Survey, flowed 89 barrels of oil hourly through ¾-inch choke on 3-hour gauge after being shut in for several days. Production is from 4026-52 feet in Bend, topped at 4020 feet. The formation was treated with 5000 gallons of acid solution.

R. P. Dorian and Mitchell's Grigsby 1, NWc SW TE&L Section 416, a mile east of New Castle, Young County, flowed 53 barrels of oil on 3-hour test after using acid and nitro at 3974-87 feet. The hole was plugged back from water in the Bend series at 4191 feet. L. T. Burns et al's Larimore 1-A, NEc NW TE&L Section 150, east of shallow production, is seeking deep production in northern Young County, and tested 80 feet of oil-cut mud and 250 feet of salt water when drill stem was used in Strawn at 3100-14 feet.

Anderson-Prichard Oil Corporation's Flaniken 1, offsetting production on the east side of the Fargo pool, assured the sixth completion from Basal Canyon when sand at 3928-39 feet yielded 1900 feet of oil on 40-minute drill-stem test. The well was deepened to Strawn series at 4360-4476 feet, where test will be made before determining casing point.

ASKANIA

GEOPHYSICAL INSTRUMENTS *for* PRELIMINARY AND DETAILED SURVEYS

•

Fifteen years of satisfactory service has established our reputation for dependable service. Write or call us for further information.

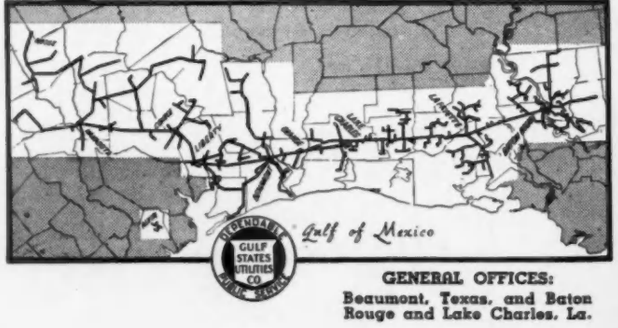
•

AMERICAN ASKANIA CORPORATION

M. & M. BUILDING HOUSTON

Ready with Reserve

Prepared to Serve!



GULF STATES UTILITIES CO

GENERAL OFFICES:
Beaumont, Texas, and Baton Rouge and Lake Charles, La.

SIMPLE
EFFICIENT
ECONOMICAL

elimination of all crude oil emulsion problems

DEHYDRATING

Tret-O-lite

Req. U. S. Pat. Off.

DESALTING

There are no *unsolved* emulsion problems at wells where you see the big red Tret-O-lite drum. It represents first aid and *final disposition* of all such problems for producers. As near as your telephone, Tret-O-lite's skilled technicians with formulae for treating every type of crude produced, are available twenty-four hours every day in all oil producing areas. Call your nearest Tret-O-lite representative for expert advisory service.

TRETOLITE COMPANY

Manufacturing Chemists

Webster Groves, St. Louis County, Missouri
Los Angeles, California
Representatives in all oil fields

LAYNE

Hydro-Pak

It is placed between the seamless steel slotted pipe tubing by hydraulic pressure. It baffles the flow, reduces velocity of fluid as it enters the screen, and minimizes any cutting action. The countless channels through which the flow passes, serve as an additional cleaning agent.

Layne Hydro-Pak is available in any length and for all size casing. Where conditions require a pre-packed gravel screen, efficiency and economy suggest the Layne Hydro-Pak.

LAYNE & BOWLER CO.

HOUSTON • TEXAS

Export: E. H. (Gene) Trammel, Room 1636
30 Rockefeller Plaza, New York, N. Y.

East Texas

Gravity Meter Indicates Deep Dome at Hawkins Field

Survey of portions of Wood, Upshur and Smith Counties in the neighborhood of the Hawkins field develops that the field is on the southeast flank of a large regional gravity minimum area, which in turn is a part of a minimum axis coming in from the northeast and continuing south from Hawkins. Known shallow domes to the south of Hawkins fall on the indicated minimum axis, and lend to the belief that the East Texas basin will show gravity minimum anomalies of some sort corresponding to structural conditions.

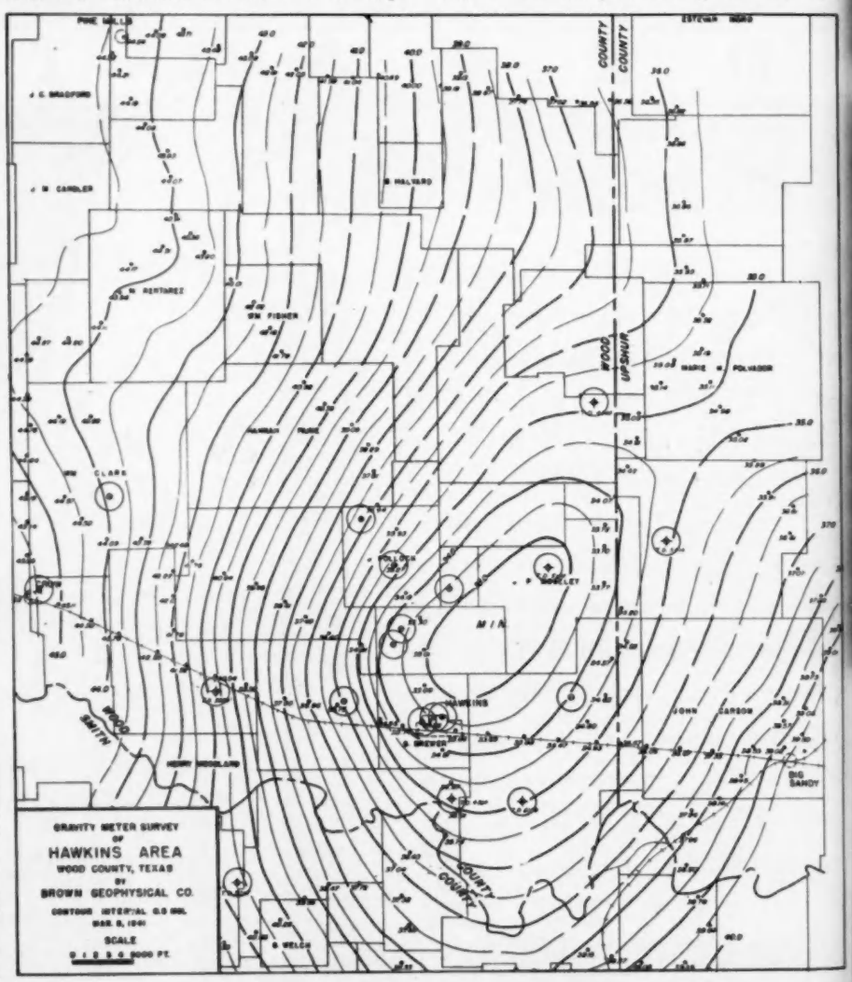
Gravity work at Hawkins indicates the field lies on the flank of a very deep-seated salt body of considerable magnitude. This does not necessarily prove that all deep-seated salt domes of similar type will be associated with regional minima. Previous experience has shown that numbers of these structures produce only small gravity anomalies, which conclusion is important in that it does not limit search to results comparable with those obtained at Hawkins, for if the search were limited only to like gravity anomalies it would be found that most such structures were already covered by lease.

This gravity survey, by indicating that the Hawkins structure is a deep-seated salt mass, adds weight to the idea that much of the structural movement in the East Texas Basin is controlled by salt, and that known shallow salt domes most likely fall within the category of salt fingers, while the deep domes, being low relief structures, apparently are the ones to trap oil in commercial quantities.

Interpreting the Hawkins gravity meter survey for oil, it is believed that the extensive area inclosed by the closing gravity contours represents chiefly a large mass of salt which has probably moved very little from the point of original deposition. From this mass an intrusion has started toward the surface, producing a structure suitable for oil accumulation in the area around it. The effect of this salt finger rising from the main salt mass would account for the tightening of the contours on the southwest of the closure, it being the combination of this lesser gravity anomaly superimposed upon the large regional gravity pattern which points toward the sought-for structure.

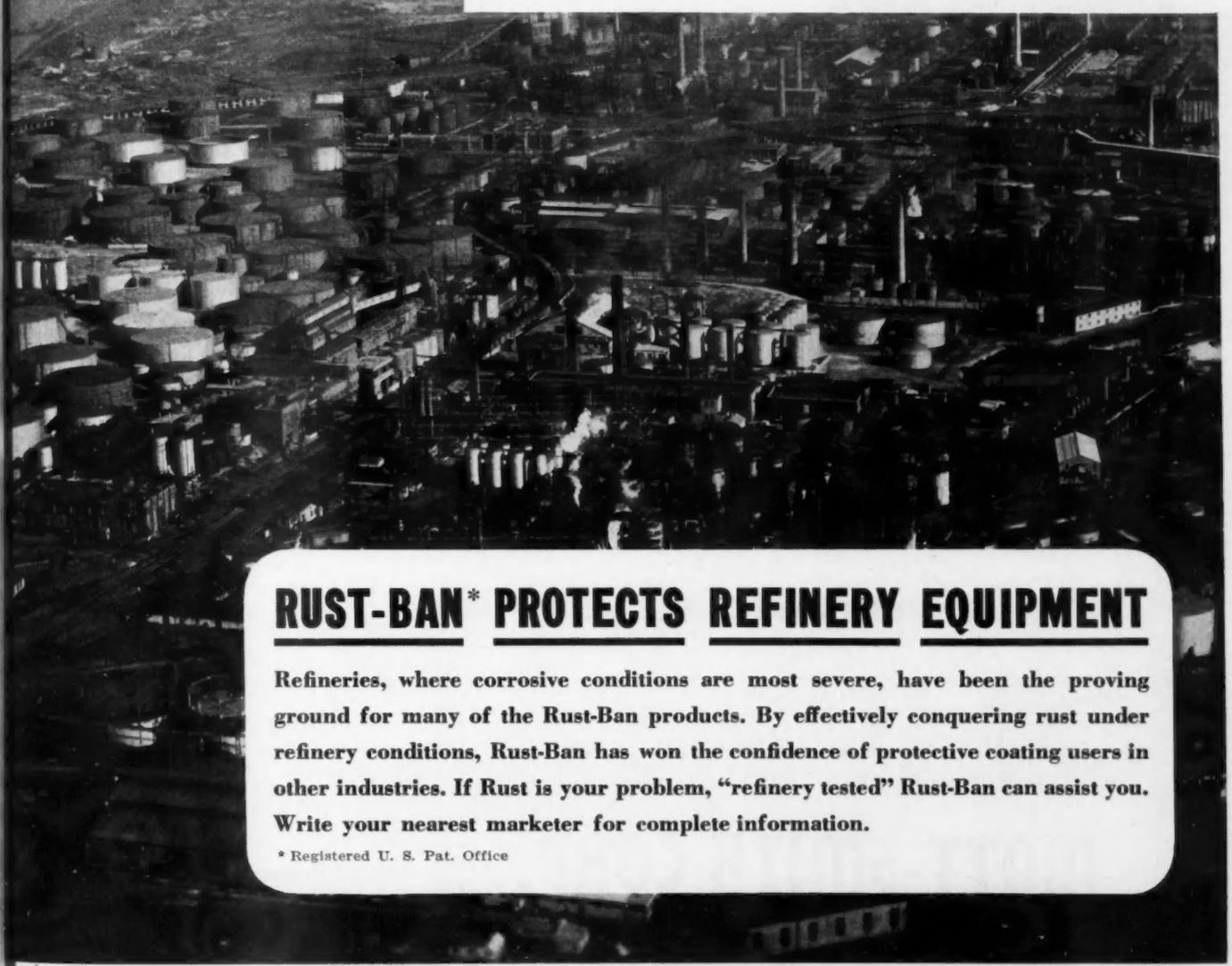
Two Oil Wells Completed In Townsite at Hawkins

Texas-Jersey Oil Corporation's McClenny 1, located on 82/100-acre in Hawkins townsite, logged an aggregate of 276 feet of oil sand, according to electrical



BEAT RUST

AT ITS WORST

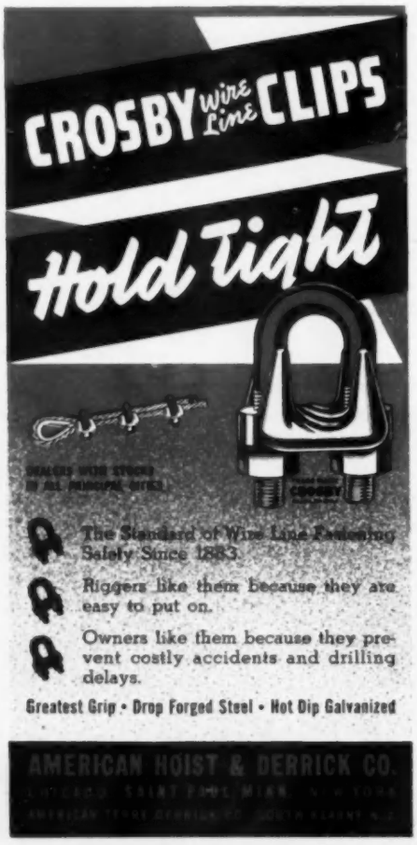


RUST-BAN* PROTECTS REFINERY EQUIPMENT

Refineries, where corrosive conditions are most severe, have been the proving ground for many of the Rust-Ban products. By effectively conquering rust under refinery conditions, Rust-Ban has won the confidence of protective coating users in other industries. If Rust is your problem, "refinery tested" Rust-Ban can assist you. Write your nearest marketer for complete information.

* Registered U. S. Pat. Office

RUST-BAN—*The most complete line of rust preventives on the market*—is sold: In New York and New England by *Colonial Beacon Oil Co.*, New York City • In Pennsylvania by *Standard Oil Co. of Pennsylvania*, Philadelphia, Pa. • In New Jersey, Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina and South Carolina by *Standard Oil Company of New Jersey*, New York City • In Arkansas, Louisiana, Tennessee by *Standard Oil Company of Louisiana*, New Orleans, La. • In Texas by *Humble Oil & Refining Company*, Houston, Texas • In Oklahoma and Kansas and parts of Missouri by *The Carter Oil Company*, Tulsa, Oklahoma • In Kentucky, Georgia, Florida, Alabama and Mississippi by *Standard Oil Company (Ky.)*, Louisville, Kentucky • In Alaska, Arizona, California, Hawaiian Islands, Idaho, Nevada, Oregon, Utah, and Washington by *Standard Oil Company of California*, San Francisco, California • In other states by *Penola Inc.*, Pittsburgh, Pa. • In Canada by *Imperial Oil Ltd.*, Toronto, Canada.


CROSBY Wire Line CLIPS
Hold Tight
The Standard of Wire Line Fastening Safety Since 1883.
Riggers like them because they are easy to put on.
Owners like them because they prevent costly accidents and drilling delays.
Greatest Grip • Drop Forged Steel • Hot Dip Galvanized
AMERICAN HOIST & DERRICK CO.

survey, between 4529-4894 feet, and set pipe at 4910 feet. The well flowed 345 barrels of 20-gravity oil on 18-hour gauge through ¼-inch choke after perforating at 4850-70 feet. General American Oil Company's Kay 1-A, center of Lot 18, Block 21, also only tapped a portion of its producing sand in perforating pipe at 4600-4700 feet for a flow of 19 barrels of oil hourly through ¼-inch choke. Electrical survey placed the pay section at 4475-4798 feet with an elevation of 401 feet. These new wells entered the Woodbine at 4374 feet and 4360 feet, respectively.

Humble Oil & Refining Company had three rigs in service last mid-week, with two wells ready to complete. These include Clift 1, east offset to the discovery pumper, and Moore 1, between the latter and the gas-cap zone, Moore 1 logged an aggregate of 150 feet of oil sand, topped at 4497 feet with an elevation of 404 feet, and halted in Georgetown at 4812 feet.

Second failure for the Crow prospect, west of Hawkins Dome, was drilled by Jackson & McGlothlin on the Moore 10-acre site, northeast of the townsite, with the hole bottomed in Woodbine water sand at 5427.

Sun Oil Company's Henderson 1, initial deep test for the Ore City geophysical prospect, was drilling at 7060 feet in the Second Glenrose, or Rodessa section. Base of massive anhydrite was called at 6924 feet. The next possible producing zone is the Pettit, due near the 7500-foot level.

Other active deep wildcats includes Tom G. Shaw et al's Wynne 1, eastern Kaufman County, drilling at 6700 feet near top Pettit, and Delta Drilling Company's Kanagerga 1, Rusk County. The latter logged base of massive anhydrite at 6480 feet, and was drilling at 6970 feet.

Announcing

A CHANGE IN THE

OWNERSHIP AND MANAGEMENT OF

MOTT-SMITH CORP.

Precision Gravity Meter Surveys

•

V. J. MEYER

President and General Manager

Southwest Texas

Agua Dulce and Stratton Areas Are Extended

Corpus Christi Corporation added nearly ½ mile to the southern end of the Stratton oil area, Nueces County, when Wardner 17 encountered a sand at 6560 feet, drilled to 6608 feet and completed for 158.79 barrels of 43-gravity oil per day, through ⅛-inch choke with 1850 pounds tubing and 2500 pounds casing pressures.

One mile east of Agua Dulce field, Ginther, Warren & Ginther's Sands & Eggert 1, Section 83, was connected to the recycling plant after flowing an estimated 75,000,000 cubic feet of gas on open test. It was cut to 3/32-inch choke, working pressure building up to 2640 pounds. Hole was drilled to 7502 feet, with perforations at 6888-6900 feet. It tends to fill in an undeveloped area between the main field and a well 2 miles east of production.

S. E. W. Oil Corporation's Morris 1, Section 71, 3000 feet west of Midway field, San Patricio County, abandoned at 6510 feet.

McSpadden Company's Clark 1-B, 1318½ feet southeast of the Coloma Creek distillate discovery in Calhoun County, cored an oil sand at 5881-87 feet and was stopped at 5951 feet for completion.

Live Oak County now becomes the center of South Texas Wilcox sand play with one new wildcat being announced and a second expected to be staked within the near future. About a dozen locations or active wells are included in the program along the trend from Zapata to Colorado County.

Henderson Coquat will drill Reagan 1, Romaro Survey, and in the Oakville field. This operation is on a highly touted prospect and is the center of considerable lease and royalty trading. Continental Oil Company is credited with planning a Wilcox test northeast of Kittie. E. M. Jones' West B-3, Owen Survey, is rebuilding rig preparatory to deepening from 9039 feet. This test blew out from the Carrizo zone at 9029-9039 feet. and burned.

Quintana Petroleum Corporation's Washburn 3, in the Washburn area of LaSalle County, set 9⅝-inch casing around 5800 feet, and will drill to 12,000 feet.

Texas Permits

The Texas Railroad Commission last week issued permits for drilling 231 wells, 14 more than were authorized the week before.

Leading the state was Southwest Texas with 83 permits, including 29 in Zapata and 11 in Jackson County. From the Gulf Coast, 20 locations were reported.

The commission approved permits for 11 additional wells in the East Texas field, with 8 in Gregg and 3 in Upshur County, while nine were listed from the remainder of the East Central Texas area.

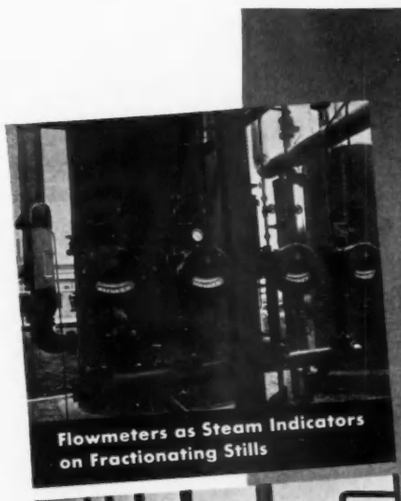
Permits for 44 wells in North Texas were granted, including 16 in Young County, while 10 were authorized in the Panhandle, 23 in West Central Texas and 31 in West Texas.

The key *to successful* repressuring

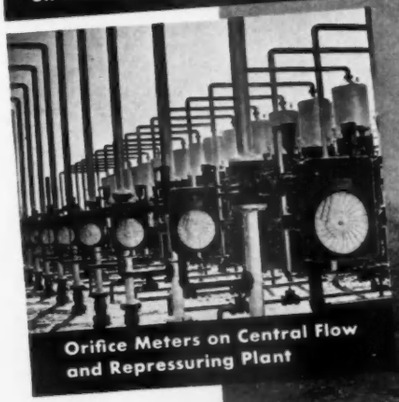
The modern way of oil and gas men is to drag even the "squeal" out of producer and reserve wells! And it works — when plant and field conditions and equipment conform strictly to the right engineering set-up.

Talk with the engineers and maintenance men. Learn why METRIC-AMERICAN Orifice Meters and Flow-meters are specified for so many of these ticklish jobs—where to be inaccurate or slipshod or fragile may put a dent in profits!

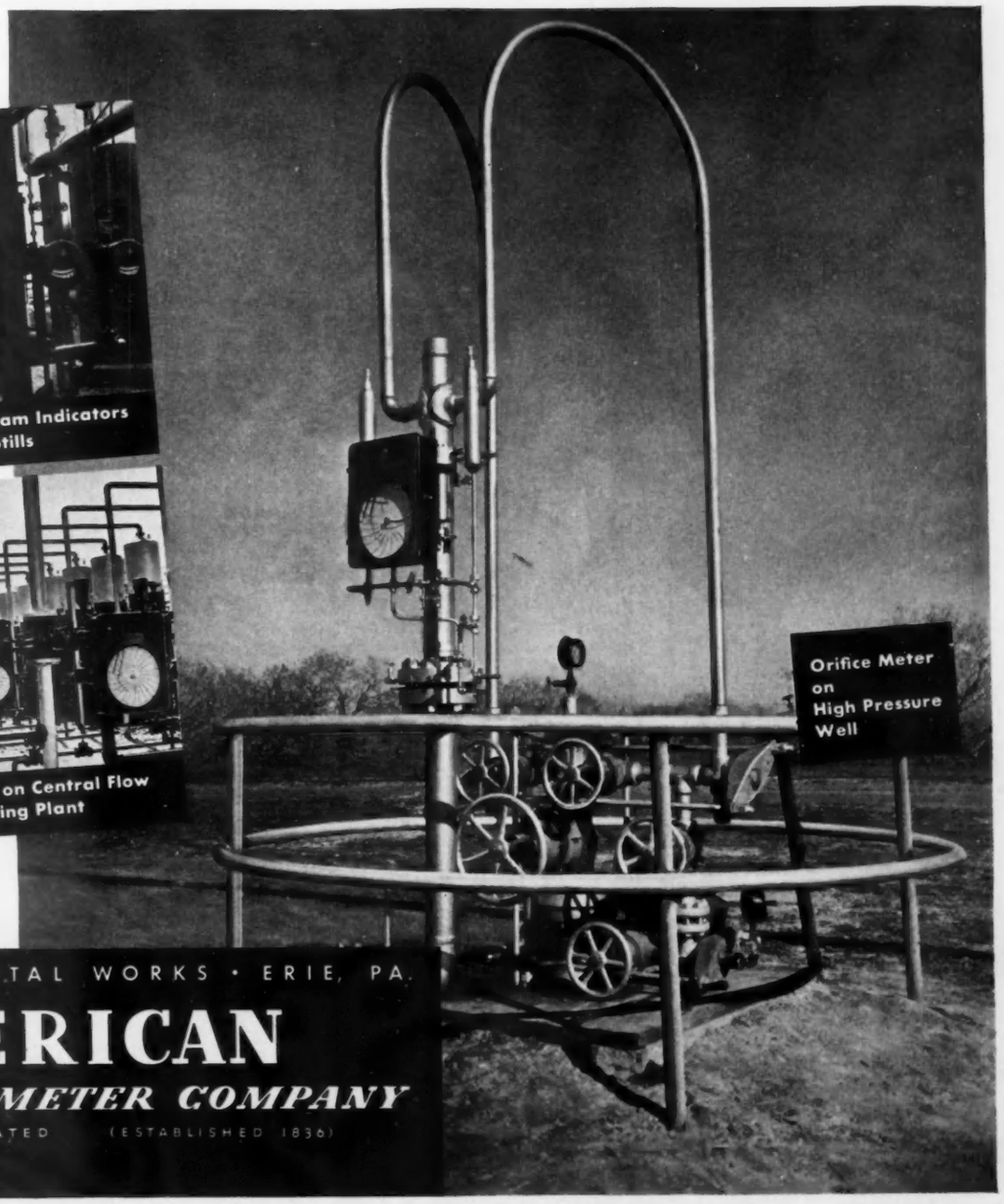
NOTE: Construction and design features of these dependable instruments are detailed in American Meter Company's engineering bulletins which will be mailed you upon request.



Flowmeters as Steam Indicators on Fractionating Stills



Orifice Meters on Central Flow and Repressuring Plant



Orifice Meter on High Pressure Well

METRIC METAL WORKS • ERIE, PA.

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

Texas Gulf Coast

New Field in Gulf of Mexico Highlights Coast Activity

British American Oil Company, Hall Jordan and Fain Drilling Company's State 2-71, 9000 feet out into the Gulf of Mexico at a point seven miles west of Sabine Pass, was brought from Miocene to open the first Texas Gulf Coast field in the Gulf. Humble Oil & Refining Company had proved a dome in the Gulf at McFaddin Beach several miles west, but so far has failed to find oil. Casing in State 2-71 was perforated with 40 shots from 4982-92 feet, and at time of latest report well was making slightly over six barrels of 26.7-gravity oil hourly through 9/64-inch choke. Tubing pressure was 700 pounds and casing, partially sealed, showed 300 pounds. Parker Drilling Company was contractor. The job presented many problems, including the sweep of waves in from the Gulf, and at times the water was so rough that crews could not be changed for over 24 hours. It often was impossible to barge equipment and supplies for drilling.

Strake Petroleum Company's Griffith 1, once completed to prove a new field, was being delayed in efforts to complete in a new, side-tracked hole and in a deeper sand. It had to make several round trips, consuming several days time, before finally perforating casing at 10,374-380 feet and setting tubing. Perforations were then squeezed, and casing will be reperforated.

Phillips Petroleum Company's Triangle Development Company 1 in the Chocolate Bayou area, was flowing a small stream of wash water from 9950-9953 feet, where it perforated in an upper sand. Earlier, it tested 53 stands of oil and mud and 23 stands of salt water from this point, and made a squeeze job to try to cut off the water before production test.

ENGINEERED

McKissick Traveling Block

To Assure Long Dependable Service with Maximum Safety!

Production men will appreciate the fact that through streamlining, we have designed this block to allow for straight fall and maximum working space in the derrick.

Its features include: Six inch diameter center pin; Extra heavy solid roller bearings; Large bearing surface for extra wear; 30 inch diameter alloy steel sheaves with grooves machined to A. P. I. line size, and heat treated for maximum wear.

It is manufactured with three or four sheaves, with a safe working capacity of 100 and 125 tons respectively. Built by a recognized leader in the manufacture of blocks for oil field use—and backed by years of experience.

McKISSICK PRODUCTS CORP.

TULSA, OKLAHOMA

Louisiana Gulf Coast

To Test Deep West Baton Rouge Wildcat

Amerada Petroleum Corporation's Wilbert 1, 12 miles west of Baton Rouge on the Wilbert prospect, will be given a production test after cementing seven-inch casing to 10,038 feet. Bottom is at 10,044 feet. A number of gas shows have been reported, and an attempted blowout occurred at approximately 9984 feet when gas and oil blew slightly. Other shows, as recorded on electric log, were at 8992-9086, 9252-71, 9366-74, 9526-44, 9556-74, 9604-30 and 9647-66 feet. This wildcat may open the first oil field in West Baton Rouge Parish.

Humble Oil & Refining Company abandoned a mile north outpost test to the North Crowley field, Acadia Parish, at 9820 feet, with no shows. The field is gradually being defined on all sides, and now only the western portion of the field remains for expansion.

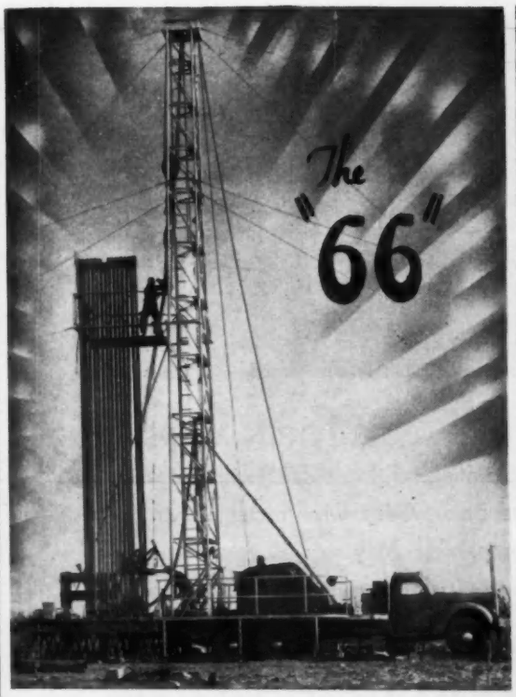
A new sand-extension test was completed by Stanolind Oil & Gas Company in the Anse La Butte field. A. Castille 1, on the south flank, gauged 194 barrels of clean oil in 24 hours on a 5/32-inch choke with tubing pressure 690 pounds and casing pressure 1060 pounds. Completion was in side-tracked hole, bottomed at 5969 feet, in open hole from 5949-69 feet. Sand was topped at 5960 feet.

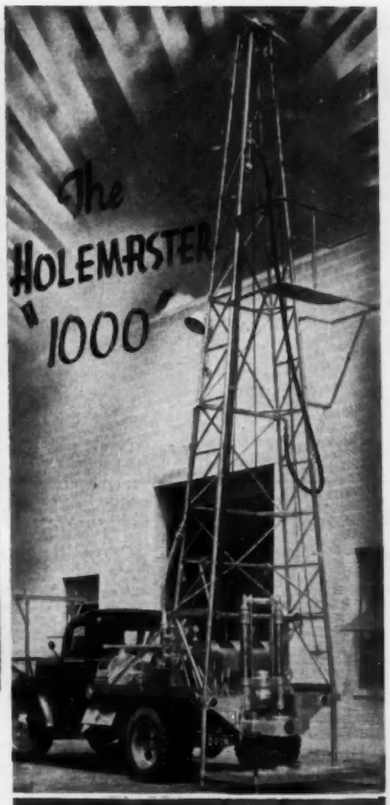
Lisbon-Iberia Oil Company was preparing to drill a 9500-foot wildcat on a 4500-acre block on the North Rayne (Branch area) prospect, Acadia Parish. The Pure Oil Company first blocked this prospect several years ago on refraction work, and later Continental Oil Company had the prospect, but let it go without drilling a well. Humble Oil & Refining Company drilled in Section 83-8s-2e, to below 10,000 feet, the closest test to the prospect.

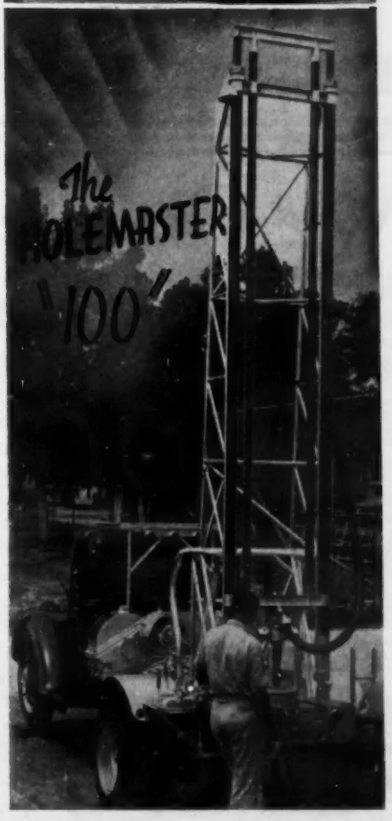
Superior Oil Company's new pay discoverty on the north flnak of Section 28, St. Martin Parish, was completed through perforations at 10,032-094 feet as a gas-distillate producer. It gauged 16.2 barrels of 47.3-gravity distillate in 24 hours through a 9/64-inch choke with 1,500,000 feet of gas. Tubing pressure was 3300 pounds. It is the second producer in the new gas-distillate field, being a north offset to the discovery, completed in the 9300-foot zone.

Hole collapsed in C. & I. Production Company's Evangeline Land & Mineral Company 1, on the east flank of the Pine Prairie dome in Evangeline Parish, and at last report was washing to bottom in an effort to regain circulation. The bit apparently hit a cavity at about 6471 feet.

Second Westwego well in Jefferson Parish flowed oil on a drill-stem test in a new sand at 9400 feet. Casing was landed at 9750 feet. It is Reese Carter's Cravens 1, an east offset to Titanic Oil Company's discovery, now abandoned.







THE FAILING "66" PORTABLE DRILL

For Deep Exploration and Slim Hole Production Drilling

This ultra-modern drilling unit offers a definite saving in moving time, rigging-up time, casing and labor costs, with some saving in fuel and bit costs. Available with 60-foot or 90-foot mast. Recommended for drilling of 7¼" hole to 4,000 feet, using 3½" drill pipe. Available on truck, track, trailer or skid mounted.

FAILING "55" PORTABLE DRILL

For Shallow Production to 2000 Feet and Deep Core Drilling to 2500 Feet

It incorporates a heavy duty hydraulic feed and is ideal for drilling electrical logging holes and core drilling. Due to the various arrangements possible with this drill and by using different size pumps to meet the customer's requirements, it can successfully be used to cover a wide field of operations for geological and exploration departments. Available on skid or trailer.

FAILING "44" PORTABLE DRILL

For Shot Hole and Core Drilling

It is especially designed to meet all the average needs of the exploration departments, combining a rugged, compact drill with sufficient capacity to handle 1500-foot core drilling, yet light enough to meet the needs of seismograph shot hole drilling.

FAILING HOLEMASTER "1000"

A new rugged shot hole drill with medium weight for mounting on standard 1½ ton trucks. Incorporates the use of an easily accessible table for convenient handling of drill pipe and casing. The table has sufficient opening for setting 3" to 4" casing. Equipped with two free-spooling drums and no cathead is required. All drives enclosed and bearings are anti-friction type of oversize capacity. The Holemaster "1000" is well adapted for shallow core drilling or drilling of electrical logging holes to 800 feet. Also for drilling of any type of vertical mineral prospecting holes and water wells.

FAILING HOLEMASTER "100" DRILL

A lightweight drill especially designed to drill seismograph shot holes and other test holes to depths of 150 feet. Due to its basic design, the speed of drilling is decidedly faster than anything heretofore used. It incorporates a new principle in shot hole drills and permits the continuous use of square kellys instead of the conventional core drill pipe.

GEO. E. FAILING SUPPLY COMPANY

GENERAL OFFICE & PLANT
ENID - OKLA

GULF COAST PLANT
HOUSTON - TEXAS

"Cores Will Tell"

TOBIN MAPS—accurate and dependable—are standard equipment with most major oil companies. May we tell you why and quote prices—without obligation?

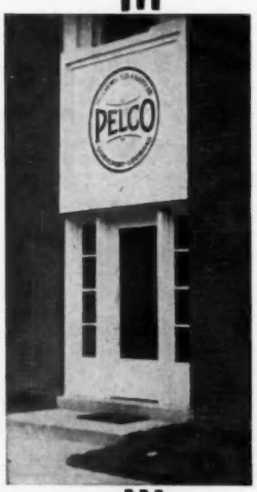
EDGAR TOBIN AERIAL SURVEYS

OFFICES:
502 W. MISTLETOE, SAN ANTONIO, TEXAS
COMMERCE BLDG., HOUSTON, TEXAS

THE MAPPING AGENCY FOR THE OIL INDUSTRY

We'd Be Nuts Not to Help!

We figured out 33 years ago that the best way for us to get along and make some jack would be to worry less about profits and more about people than seemed customary in the supply business. Each of our customers has a job or a business on which he depends for groceries, shelter, fig leaves and luxuries. Unless the business is profitable there are no dividends for us. So we'd be nuts not to help. No doubt this conclusion—too bad the government can't reach it!—makes a difference in the brand of service we dish out. Customers seem to like it.



PELICAN WELL TOOL & SUPPLY CO.

SHREVEPORT
LOUISIANA

PELCO

Houston
Berwick
Houma
New Iberia
Magnolia

North Louisiana

Little Creek, LaSalle Parish, Has Second Oil Producer

H. L. Hunt's second producer in the Little Creek area, LaSalle Parish, was completed at Doughty 1, NE SW 32-9n-2e, where casing was cemented on bottom at 3603 feet. Flow of 8 barrels of oil per hour was through ¼-inch tubing choke with tubing pressure 250 pounds and casing pressure 650 pounds. Hunt staked two locations there. A location was staked in the Summerville area, LaSalle Parish, newly opened as an oil producing area in LaSalle Parish.

Four miles northwest of the Nebo (Jena) field, LaSalle Parish, Big West Drilling Company's Whatley 1, NE NE 25-8n-2e, after testing estimated 8,000,000 cubic feet of gas daily with a showing of oil at 3430-52 feet, had plugged back for a test at 3165 feet when the well caught fire, destroying the derrick. The fire was extinguished. M. L. Meredith staked Gray 1, NE NE 36-8n-2e. In Catahoula Parish in the "Olla trend," H. L. Hunt abandoned Southern Kraft 1, C SE SE 19-10n-6e, at 5215 feet, after no shows in Wilcox.

In the Greenwood area, west Caddo Parish, Delta Drilling Company's Thigpen-Herold 1, C S½ 13-17n-16w, after coring a gas-distillate sand at 2443-63 feet cut another 20-foot core with only one foot recovery but this showed oil saturation. Operators planned to core to 2700 feet and run electrical log.

In the Logansport area, Grady Vaughn has unitized lots and tracts into 60-acre plots for a 5000-foot test in the vicinity of Section 3-11n-16w. The Hunter Company completed title on a 480-acre lease in this area, Townships 11 and 12 north, Ranges 14 and 15 west. Brothers and associates negotiated for a 70-acre lease in NWc 10-11n-16w, for a Glen Rose test and George L. Pace was taking a 1200-acre block centering around Section 16-10n-12w, DeSoto Parish, for a 3200-foot test.

W. S. Reineck reported 8 feet of broken Nacatoch sand showing oil at 2342-50 feet in Hudson 4, 1204 feet north and 732 feet west SEc 7-23n-1e, Union Parish wildcat in the old abandoned Oakland field, that secured several small shallow producers in 1923 and then became depleted. Casing was cemented at 2340 feet for a test.

Tide Water Associated Oil Company, which has a repressuring project under way in the shallow Bellevue field, Bossier Parish, found productive in the 300-400-foot shallow Nacatoch in 1921, is using a water-drive system to operate the unit since causing equalization of pressures by taking gas from 4 shallow gas wells and injecting the gas into 9 injection holes, all in S½ 10-19n-11w.

Dean Brothers of Fort Worth for some time have been negotiating with Premier Investment Company, also of Fort Worth, to acquire the latter's Bellevue properties, including leases on 5000 acres in and around the field, which is structurally a truncated dome.

Leases call for all rights to 600 feet and half the rights below that level. The leases in the field owned by Premier have both oil and gas wells, all of small volume, the oil wells averaging about 4 barrels each per day, with the gas proportionately smaller.

Arkansas

McKamie Wells Makes 17 Barrels Distillate Hour

In the McKamie field, LaFayette County, Atlantic Refining Company's Bodcaw 4, C SW SW 28-17-23, completed at 9350 feet, after perforating with 180 shots from 9254-90 feet in Smackover lime flowing 17 barrels of distillate per hour through 9/64-inch choke, with gas/oil ratio approximately 8000/1. Bodcaw 3, C NE SE 29-17-23, went into Eagle Mills at 9972 feet after logging 908 feet of Smackover lime (elevation 272 feet). Total depth is 9980 feet and final casing was set on bottom to perforate at the 9200-9300-foot level. This is the first test at McKamie to explore the lower Smackover lime, and is the deepest hole drilled in Arkansas.

Louark Producing Company's Hedrick 1, C NE SE 27-19-27, prepared to core ahead at 6291 feet after a 20-foot core from 6271-91 feet logged shale and hard lime with no showing. Previously the test showed 160 feet of mud with an odor of oil when formation tester was run at 6201-32 feet.

Phillips Petroleum Company rigged for a Smackover lime wildcat test at R. S. Warnock 1, C SW NW 1-17-20, Columbia County, a location which has been pending several months. Standard Oil Company of Louisiana drilled a dry hole a mile north to the Smackover lime in December, 1939.

In St. Francis County, U. S. Oil Corporation's Wilford 1, SE NE 29-4n-1w, which had shown some oil and gas in production test at 2265 feet, was abandoned.

Mississippi

Mississippi Geologists Issue Manual on Well Study

A manual containing cross sections of ten representative wells of Central Mississippi is being issued by the Mississippi Geological Society.

The sections show work done by the society's study group during the past summer. The group was organized with Arthur Wedel, The Pure Oil Company, as chairman, and on his transfer from the area was headed by A. A. Hosten, Stanolind Oil & Gas Company. Sample information and electric logs were used in making the correlations.

The manuals may be obtained from D. C. Harrell, secretary of the society, Box 1490, Jackson, Mississippi, at $2 each.

Tinsley Dome Adds Six Oil Wells During Week

Tinsley Dome had one of its best weeks in recent months last week when 6 oil wells were completed and 10 locations were staked.

Two locations east of production in the southeast part of the field, J. P. Evans' Dazell Johnson 1, C NE NW 31-10n-2w, swabbed with oil showing at 5048 feet after Woodruff sand was logged from 4947-5028 feet (elevation 344). The operator rigged for a south offset.

On a 3000-acre wildcat block in Perry County, south Mississippi, Fred E. Courson moved in material for Newman 1, NE NW 21-2n-10w, for a 7500-foot test.

Lewis A. Ellis and G. L. Reasor of Chicago have let contract to Jack Read of Scottsville, Kentucky, to drill a 3100-foot test on a 20,000-acre block in Winston County, Alabama, near Haleyville. Read also has been awarded contract to deepen Mellen & Gear's Alsobrook 1, SW SW NW 10-4s-15w, Colbert County, Alabama, drilled to 1048 feet. Hole will go to 1800 feet.

Humble Oil & Refining Company has acquired, from Peninsular Oil & Gas Company, a block of 1,000,000 acres of leases owned by the Barron G. Collier Estate in southern Florida, mainly in Collier County. Humble Oil & Refining Company has seismograph and gravimeter units working in Dade County, Florida.

Michigan

New Osceola County Area Receives New Pay Zone

Osceola County took on added importance as Weber Oil Company's Fatum 1, SW SW SE 30-18n-10w, Lincoln Township, recovered 35 barrels of 41-gravity oil by swab and flow in its first 24 hours on test from Dundee lime at 3517 feet. Location is ¾ mile north of the same company's Gable 1 discovery, drilled last year and completed for 30 barrels oil a day from Monroe lime at 3630 feet. Fatum 1, first completion since the discovery, was reported structurally higher. Dundee top

It takes
PERFORMANCE
to HOLD
FIRST
PLACE
GATKE
GATKE
DEEP-WELL WOVEN
• Stands the heat and holds in deep well drilling and tough maintenance service.
• Feeds off with uniform ease from the top of the hole all the way down.
• Wears unbelievably long and prolongs flange life.
• Furnished in Die-Pressed Blocks, Segments, and Band Lengths, or Woven-Moulded Combination Sets.
Throughout the oil fields GATKE Brake Lining has come to mean "The best that money can buy."
Successful operators agree that standardization on GATKE Brake Lining is the way to get real performance and lowest ton-mile costs.
That's why GATKE Brake Lining is predominantly supplied by manufacturers of Drilling and Production Rigs as original equipment.
Avoid substitutes. Your Rig manufacturers have GATKE Brake Lining that is engineered for the application.
FACTORY
Warsaw, Ind.
FACTORY
North Brookfield, Mass.
GATKE CORPORATION
228 N. La Salle St.
Chicago, Ill.

was logged at 3504 feet. The discovery carried oil and water in the same zone. and was not completed as commercial well until deepened into the Monroe. The Pure Oil Company and Gulf Refining Company, along with Weber Oil Company control the bulk of the acreage in the area.

The Pure Oil Company's State A-2, Section 15-19n-3e, first deep test in the Adams field, Arenac County, was drilling at 4615 feet in shale and lime of the Detroit River series, making little progress against oil and water logged in upper horizons. The test was making about three bailers of oil and nine bailers of water every 24 hours from Monroe lime at 4265 feet. The Sylvania sand, expected between 5200 and 5500 feet, is the objective. Don Rayburn announced intentions to carry Fox 1, Section 21-19n-3e, a mile south of State A-2, to the Sylvania. Casing now set with a packer at 2884 feet will be pulled and reset at 3400 feet through the upper Monroe water horizon.

First shallow gas discovery of the year was Burruss & Quinlan's Winesburgh 1, SE SW SW 20-14n-5w, Deerfield Township, Isabella County. It gauged 2,200,000 feet in Stray sand at 1292 feet, with top of sand at 1285 feet.

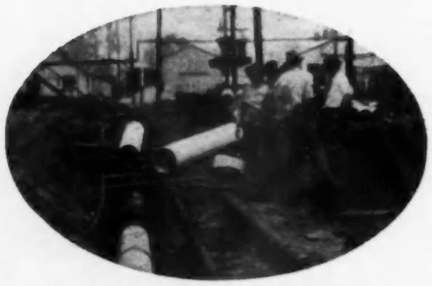
Gulf Refining Company was conditioning hole and mud for setting a whipstock at 6265 feet in Bateson 1, Section 2-14n-4e, Bay County, to side track from 1340 feet of lost 4½-inch drill pipe on bottom at 7776 feet. Salt water and gas from zones above the cement plug set at 6432-6228 and drilled back to 6265 feet, has set up a severe mud conditioning problem.

STANDS UP LONGER
IN OIL-FIELD SERVICE...
J-M TRANSITE PIPE

HIGHLY CORROSION-RESISTANT, strong and durable, Transite Pipe assures continued low maintenance.

MORE and more leading oil producers are proving that salt-water and lead lines cost less with J-M Transite Pipe. Both inside and out, this tough asbestos-cement pipe offers unusual resistance to corrosion. It cannot rust or decay . . . keeps maintenance cost down during years of low-cost service.

But long life isn't the only feature of Transite Pipe. Transite's light weight and simple assembly method speed up installation. Long, 13-foot sections cut down the number of joints in the line. Because leakage is minimized, there's little danger of crop damage or groundwater pollution. For full details, write for brochure DS-320. Johns-Manville, 22 East 40th Street, New York, N. Y.



THIS DISCHARGE LINE carries salt water from hot well to cooling tower.

JM Johns-Manville
TRANSITE PRESSURE PIPE
For Salt Water Disposal Systems and Lead Lines

California

Newhall-Castaic Most Active Wildcat District

Prospect currently most active is the Newhall-Castaic area in Los Angeles County where eleven wildcat projects are now under way or scheduled to be spudded in within the next month. Revival of interest in this area has been growing since discovery of the Rancho San Francisco field several years ago by Barnsdall Oil Company, and was further heightened by the Tide Water Associated Oil Company's discovery of Aliso Canyon field. Last year, successful completion of R. E. Havenstrite's discovery of the Del Valle field launched a number of wildcat ventures and a brisk leasing campaign which reached its most competitive pitch in the spirited bidding for the Los Angeles Prison Farm property which went to Barnsdall Oil Company.

Companies active in this area now include Aztec Oil Company, The Texas Company, Hathaway Company, Western Gulf Oil Company, St. Anthony Oil Company, Mangold & Morse, Universal Consolidated Oil Company and Newhall-Potrero Oil Company. The area is less than twelve miles long and five miles wide.

In the Tejon Ranch area of Kern County, Richfield Oil Corporation was planning to drill a wildcat northwest of the recently abandoned Tejon Ranch No. 1, Section 2-10-19.

Consolidated Petroleum Company is understood planning a test north of the recently developed easterly extension area of the Montebello field, Los Angeles County.

New Mexico

To Drill 5300-Foot Lea County Wildcat

The first of a group of wildcats pending in Lea County involves J. W. Brown, Inc.'s State 1, center Lot 11, Section 4-16s-35e, 6¾ miles west of the town of Lovington. Majors have contributed cash and acreage for completion of a 5300-foot test.

First operation in the Lovington 34-well pool, Lea County, in more than a year involves Fred Turner, Jr., et al's Webb 1, SE SW NW 31-17s-37e, a new test for the northeast edge. This area has consistently produced its maximum allowable, and affords opportunities for independents to obtain lease farmouts adjacent to production from majors.

Expansion of the Maljamar field, most active drilling center in the state for some months, to the southeast was assured through Weier Drilling Company's Johns 1-B, C NW NE 35-17s-32e, having showed for a pumper in upper pay at 3575-85 feet, and was carrying 1500 feet of oil in hole while drilling at 4115 feet. Drilling & Exploration Company, Inc. was starting a development program east of the field proper, with its initial test as Johns 2-B, C NW SW 24-17s-32e, on acreage sold by Emperor Oil Company along with Johns 1, C SW NW 24-17s-32e, which was 2¼ miles east of nearest production when completed in January, 1938.

UNITED STATES WELL COMPLETIONS

Arkansas

La Fayette County (McKamie)—

Company, Well and Location	Init. Prod. Bbls.	Depth
Atlantic Ref. Co., Bodcaw Lbr. Co., 28-17-23	408	9350

St. Francis County (Wildcat)—

U. S. Oil Corp., Wilford 1, 29-4n-1w	*	2265

Union County (Smackover)—

J. D. Reynolds, Laney B-2, 8-16-16	70	2693

California

Fresno County (East Coalinga Eocene)—

Robert S. Lytle, No. 46-18F	2410	8041
Standard, No. 53-19F	1830	7765
Superior, Cagle 6	1320	7085

Kern County (Coles Levee)—

Richfield, KCL-B 16-27 (pb 9254)	1265	9692

Kern County (Edison)—

Wood-Callahan, Heyden 2 (pb 3600)	No. Est.	5150

Kern County (Elk Hills)—

Standard No. 44-29S (pb 3232)	No. Est.	3900

Kern County (Grapevine)—

Richfield, Tejon Ranch 1	*	10,940

Kern County (Kern River)—

D. B. K. Co., No. 12	5	390
Stephens Oil Co., Stephens 1	90	521

Kern County (Mt. Poso)—

Shell, Mathew Fee 8	No Est.	1780

Kern County (Paloma)—

Western Gulf, KCL-B 12-12	800	10,750

Kern County (Richgrove)—

White River Explor. Co., Salsa 1	*	1610

Kern County (Rio Bravo)—

Superior, Osborne 1-2	1510	11,470

Kern County (Ten Sections)—

Shell, KCL A-87-30	636	8210

Los Angeles County (Dominguez)—

Union, Austin 7	761	7206

Los Angeles County (Rosecrans-Athens)—

Royalty Service Corp., Stein 1 (pb 7915)	200	8002

Los Angeles County (Wilmington)—

Atlantic Oil Co., No. 19	200	3555
L. B. Oil Development Co., "W" 26 (pb 3945)	526	3997
Union Pacific, UP 169	231	5456
UP 174 (pb 3479)	35	3506
UP E-30 (pb 3933)	60	4042
Vulcan Oil Co., No. 469-2	No. Est.	3300

Ventura County (Ventura Avenue)—

Tide Water, VL&W 36	3600	9780

OLD WELLS DEEPENED

Kern County (Midway Sunset)—

General Pet., Moco 34-186A (otd 1134)	34	945

Los Angeles County (Dominguez)—

Union, Callender 82 (otd 7100)	103	7759

*Failures; †Junked; ‡Million cu. ft. gas.

Los Angeles County (Montebello)—

Union, Wilcox 7 (otd 7650)	361	7705

Los Angeles County (Wilmington)—

Macson Oil Co., "G" 1 (otd 3663)	No. Est.	3670
Wilmith Petroleum, No. 2 (otd 3675)	No. Est.	3685

Ventura County (Rincon)—

CCMO Co., Hobson B-16 (otd 4650)	95	4800

Ventura County (Ventura Avenue)—

Shell, Edison 31 (otd 7710)	377	8447

Illinois

Clay County—

Pure, Bates 1, w½ ne sw 3-2n-8e	*	3068
Warren & Bradshaw, Cruse 1, ne ne nw 9-4n-5e	*	2750
Hammer et al, Rose 1, ne se ne nw 22-6n-5e	140	2509
L. & W. Dr. Co., Davis 1, nwc ne 22-6n-5e	135	2517

Fayette County—

Paul Holleman, Kruse 1, ne sw nw 36-5n-2e	*	2194
Carter, Giles 1, se sw ne 1-8n-3e	216	1528
Buzzard 1, se sw sw 35-9n-3e	150	1529

Franklin County—

Shell, McKemie 2, ne sw se se 24-6s-2e	360	2168

Hamilton County—

D. & P. Oil Co., Zellar 1, sw ne sw 26-3s-5e (pb 3299)	*	3376
Hall-Jordan Oil Co., Deerhake 1, sw ne ne 34-3s-5e	710	3373
Earl Witt et al, Gage 1, ne se ne 34-3s-5e	240	3356
Sinclair-Wyoming, Stelle 5, ne nw se 27-5s-6e	151	3052
Mammoth, Jackson 3, sw sw sw 35-5s-6e	74	3047
Eason Oil, Prince 1, ne se ne 36-5s-6e (pb 2990)	131	3188
Pure, Cuppy 1, ne ne sw 6-6s-7e	*	2745
Massey-Diggs, Hardesty 1, w½ ne sw 20-7s-5e	*	3362

Jasper County—

Buerkle, Payne 1, ne se ne ne 6-5n-10e	*	2897
Pure, Adams 3, e½ nw ne 20-5n-10e	1121	2830
Frohning 2, w½ nw sw 33-6n-10e	937	2828

Jefferson County—

Nash Redwine, Cameron 2, se se sw 9-1s-2e	86	1946

Marion County—

Shell, Ahlf 4, sw sw ne 18-3n-1e	39	1438
Schoenfeld-Kitch et al, Hudspeth 2, se se 27-4n-1e	25	1371

Richland County—

Pure, Surovjak 1, w½ se ne 7-4n-10e	113	2940

Shelby County—

Carter, Richards 1, se ne se 19-9n-4e	*	2025

Wabash County—

Chet Evarts, Williams 2, se se nw 1-1n-12w	95	2036
Joe Young, Alka 5, se sw sw ne 1-1n-12w	240	2032
Stillwell 1, nec sw se 1-1n-12w	125	2033
Bell Bros et al, Stillwell 1-D, swc ne sw 12-1n-12w	*	2304
O'Mera, Harris 4, se sw se 17-1s-12w	40	1564
J. Meyers, Harris 2, sw se sw 17-1s-12w (pb 1559)	250	1567
Shell, Highland Comm. 1, sw se sw 17-1s-12w (pb 2051)	227	2379
Highland Comm. 2, nw ne sw 17-1s-12w	190	2397
Risley 2, nw sw se 17-1s-12w (pb 2050)	50	2390
Hall-Jordan, Carson-Harris 2, nw ne nw ne 20-1s-12w	117	2071
Martha Coffman 1, sw se nw ne 20-1s-12w	144	2049
Hudson-Hell, Coleman 1, ne sw sw se 20-1s-12w	108	1550
Ill.-Mid-Cont. Oil Co., Croft School 1, swc nw ne 20-1s-12w	128	2072
Jacquess 1, sec ne nw 20-1s-12w	69	2064
Nickens & Rushing, Schucker 1, nec nw 20-1s-12w	150	2072
E. O. Olds et al, Parkingson 1, blk 52, 29-1s-12w	*	2418

Washington County—

Shell, Brown 4, se nw 23-1s-1w	102	3150
J. L. Murphy, Fee 2, nw nw ne 29-3s-4w	*	1044

White County—

Yingling Bros., Bump 2, ne nw ne nw 33-3s-14w	95	2970
Buell & Herndon, Bond 6, se nw ne 8-4s-14w	250	2841
Bond 7, se sw ne 8-4s-14w	300	2839
Garrison 2, nw sw ne 8-4s-14w	425	2841
Delta Dr. Co., Boultinghouse 6, se sw nw 16-4s-14w	135	2857
Paul Miller, Ford 1, nw sw sw 16-4s-14w	250	2859
Ford 2, sw sw sw 16-4s-14w	400	2860
W. Duncan, Bramlett 2, se ne sw sw 17-4s-14w	75	2900
Hughes 5, sw se se 17-4s-14w	363	2594
Ryan Oil, Bramlett 15, c e½ se sw 17-4s-14w	*	3005
Superior, Fitton 3, sw sw se 28-4s-14w	200	2725
Fitton 7, ne se se 28-4s-14w	400	2834
Ford 2, sec nw se 28-4s-14w	410	2840
Tidewater, Dennis 16, se se sw 28-4s-14w (pb 2735)	140	2834

[*Continued on next page*]

Summary of Drilling Operations in the United States, Week Ended March 29, 1941

	WELLS COMPLETED								*PERMITS FOR NEW WELLS				
		New Wells Drilled for Oil and Gas											
	Total for Week	Oil Wells	Gas Wells	Failures	†Miscellaneous	Initial Production	Total 1941	Total this Date 1940	This Week	Total this Month	Total 1941	Total this Date 1940	Year Total 1940
Arkansas	3	2	....	1	....	478	34	48	1	7	33	32	153
California	30	28	....	2	....	16,449	268	255	28	84	213	258	1,042
Colorado	.....	....	....	....	....	.....	3	2	....	.....	....	.....	.....
Illinois	74	49	1	17	7	11,357	741	876	70	372	938	963	4,532
Indiana	7	4	1	2	....	308	114	97	....	.....	....	.....	.....
Kansas	31	25	1	5	....	.....	460	375	28	143	424	427	2,048
Kentucky	4	1	....	2	1	12	63	58	....	.....	....	.....	.....
Louisiana	13	10	....	3	....	2,409	328	376	39	139	360	359	1,658
Michigan	14	5	3	6	....	225	191	329	11	68	192	318	1,093
Mississippi	6	6	....	....	....	3,600	38	34	....	.....	....	.....	.....
Missouri*	.....	....	....	....	....	.....	1	1	....	2	2	.....	26
Montana	.....	....	....	....	....	.....	48	27	....	.....	....	.....	.....
Nebraska*	1	....	....	1	....	.....	23	.....	....	4	17	.....	69
New Mexico	6	3	1	2	....	170	84	189	7	41	95	192	559
New York	12	9	....	....	3	56	158	282	....	.....	....	.....	.....
Ohio	25	4	16	2	3	515	356	218	....	.....	....	.....	.....
Oklahoma	33	16	5	7	5	7,072	460	510	37	143	409	494	1,888
Pennsylvania	34	23	4	1	6	23	495	922	....	.....	....	.....	.....
South Dakota	.....	....	....	....	....	.....	....	1	....	.....	....	.....	.....
Tennessee	.....	....	....	....	....	.....	....	5	....	.....	....	.....	.....
Texas	162	120	3	38	1	88,390	2,132	2,625	231	1,155	2,362	2,741	11,170
West Virginia	11	1	9	1	....	2	174	154	....	.....	....	122	782
Wyoming	.....	....	....	....	....	.....	23	40	....	.....	....	.....	1
Total this week	466	306	44	90	26	131,066	6,194	7,424	452	2,158	5,045	5,906	25,021
Total last week	504	304	53	122	25	129,902	5,728	6,937	417	1,706	4,593	5,592	25,021
Total this year	6,194	3,924	573	1,442	255	1,897,450	....	.....	....	.....	....	.....	.....

* This tabulation includes those states where weekly data are available; figures for Missouri date from August 10, 1940; Nebraska from August 3, 1940.
† Includes old wells deepened, water-intake, gas input, and salt water disposal wells.

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth

ILLINOIS—Continued

Sun, Greathouse 23, nw ne sw 33-4s-14w	200	2728
Bell Bros., Golden 1, sw sw nw 28-5s-14w	15	2835
Exchange-Ohio, Meyers 1, sw sw sw 1-6s-9e	25	2195
Holderby 1, se ne nw 11-6s-9e	*	2337
National Pet., Reibstock 2, se se nw 11-6s-9e	120	2282
Rebstock 3, ne se nw 11-6s-9e	78	2295
P. W. Anderson, Storms 1, nw sw ne 23-6s-9e	¶5.5	2251
Skelly-Sinc.-Wyo., ne se ne nw 15-7s-9e (pb 2303)	*	2303
Williamson County—		
Nation, Watson 1, ne nw ne 14-10s-2e	*	2167
Scott et al, Lockard 1, ne se se 20-10s-2e	*	2202
Three Sisters Oil Co., Cortner 1, sw nw sw 23-10s-4e	*	2431
OLD WELLS DEEPENED		
Marion County—		
Magnolia, Shanafelt 33, ne ne nw se 29-2n-2e (otd 3467)	146	4611
Texas, Fossieck 12, se ne sw 29-2n-2e (otd 3423)	196	4660
Frederick 23, nw ne sw sw 29-2n-2e (otd 3390)	126	4624
McCollum 21, nw se se 29-2n-2e (otd 3442)	70	4705
Schoenfeld et al, Thompson 1, nw nw nw 35-4n-1e (otd 1364)	205	1374
White County—		
Compton et al, Potter 1, ne ne se 8-4s-14w (otd 2740)	70	2823
SALT WATER DISPOSAL WELL		
Washington County—		
Shell, Brown 1, swc se nw 23-1s-1w	...	1200

Indiana

Daviess County—		
Midwest Dev., Nolen 5, sw ne ne se 2-2n-5w	¶0.2	535
Gibson County—		
Hall Edwards, Rec., Maier 27, swc ne 7-3s-13w	23	2532
Continental, Bozeman 28, sw sw ne 23-3s-14w	135	3526
Keck 20, ne ne se 27-3s-14w	150	2877
Posey County—		
Travis, Crum 1, nw nw sw 5-4s-13w	*	2955
Spencer County—		
Dice, Lorch 1, sw nw sw nw 12-6s-4w	*	775

Kansas

Barton County—		
Texas, Marchand 2, c s½ n½ sw 13-20-12w	473	3358
Isern Bros., Lillard 1, c w½ sw se 6-16-11w	*	3278
Magnolia, Grossardt "A" 1, c n½ ne nw 9-17-11w	3000	3293
Butler County—		
Cities Service, Love 34, ne se sw 20-28-4e	16	1771
Adair & Morton, Brandt 15, c w½ w½ ne 15-28-7e	336	2738
Grallop et al, Barnes 1, sw ne sw sw 16-29-4e	*	1910
Cowley County—		
John Young et al, Lantz 1, ne nw sw 14-34-3e	*	730
Ellis County—		
Champlin, Hadley "D" 6, c s½ ne sw 17-11-17n	3000	3425
Dickey, Carmichael 3, c w½ ne ne 18-11-17w	3000	3358
Ellsworth County—		
Shell, Stevenson 1, sec sw 35-16-10w	1931	3308
Continental et al, Rolfe 8, cwl sw se ne 28-17-8w	205	3240
Gulf, Mehl 4, c s½ ne nw 18-17-9w	994	3279
Central Pet., Francis 4, nw se nw 19-17-9w	1662	3246
Greenwood County—		
O.K.O., Wiershing 9, sw se nw nw 24-26-9e	30	2141
Weideman, Lewis "A" 6, c n½ se sw 25-27-8e	¶1.0	1126
Vandeventer, Souder 1, nec 5-28-11e	25	841
Harvey County—		
Hall-Jordan, Horty 1, sw nw nw 18-23-3w	115	3361
Marion County—		
Ring-Mac Oil Co., Scheck 1, nec nw 33-17-4e (pb 2440)	35	2482
Reno County—		
Bay, Woodson 1, c e½ ne nw 28-26-9w	*	4377
Rice County—		
Continental, Gray 3, nw se sw 19-18-7w	3000	3192
Gibson 4, nw se sw 24-18-8w	3000	3214
Continental et al, Kimpel 6, sw ne nw 25-18-8w	3000	3208
Gulf, Ames 6, sw ne nw 6-18-10w	3000	3241
Crosbie, Wright 2, c n½ ne se 13-20-6w	120	3336
Stormfeldt & Hyde, Graham 1, c w½ nw se 16-20-10w	3239	3198
Russell County—		
Wakefield et al, Holland 1, c e½ ne se 30-13-13w	*	3373
Coralena, Phinney 5, c s½ nw ne 30-14-13w	2811	2980
Texon, Hall "A" 2, sw nw ne ne 35-14-13w	624	2880
Cities Service, Strecker "A" 11, c e½ se ne 35-14-14w	3000	3174
Palmer, Neidenthal 1, c w¼ sw se 23-14-15w	3000	3171
Stafford County—		
Magnolia, Tretbar 4, c n½ ne se 12-24-11w	350	3755

Kentucky

Christian County—		
F. C. Thomas, Tucker 1	*	434
Daviess County—		
J. C. Miller, Morgan 10	12	1283
McLean County—		
So. Penn Oil Co., Coke 1	*	2048
OLD WELL DEEPENED		
McLean County—		
J. C. Ellis, Thornberry 1, (otd 1307)	*	1661

South Louisiana

Terrebonne Parish (Caillou Island)—		
Texas Co., State 60	216	8280
LaFourche Parish (Golden Meadow)—		
Texas Co., E. L. Deramee 2	552	10,425
State 12	54	2800
Plaquemines Parish (Potash Dome)—		
Humble, Orleans Levee Bd 49	730	8636
Calcasieu Parish (SulphurMines)—		
Union Sulphur, Fee 877	98	5490
Evangeline Parish (Ville Platte)—		
Continental, Deville 1	125	10,950
Vidrine 1	376	10,281
St. Martin Parish (Duck Lake)—		
Shell, State 1	*	11,205

North Louisiana

Caddo Parish (Pine Island)—		
P. D. & E. Oil Co., Burton 1, Burton 1, 36-21n-16w	28	1548
Rothakis et al, Wilkinson 1, 33-22n-16w	*	2469
Magnolia, Herndon 15, 22-21n-15w	38	1573
Catahoula Parish (Wildcat)—		
H. L. Hunt, Southern Kraft 1, 19-10n-6e	*	5215
La Salle Parish (Little Creek)—		
H. L. Hunt, Doughty 1, 32-9n-2e	192	3603

Michigan

Allegan County—		
Lang & Lewis, Moore 1, sw sw ne 28-1n-14w	*	1261
Rex O. & G. Co.'s Palmbos 1, sw se se 4-4n-13w	*	1678
Socony-Vacuum, Green 2, ne ne nw 4n-13w	75	1584
Bridger Basin Oil Co., Foster 1, ne nw sw 29-1n-13w	35	1366
Arenac County—		
Don Rayburn, Milne Al, nw nw nw 25-19n-3e	65	2956
Clare County—		
S. J. Higelmire, Wheeler 1, c n se ne 34-19n-6w	*	3932
Gladwin County—		
Whitehill & Drury, Cingano 4, nw sw ne 36-17n-2w	45	3860
Isabella County—		
Burruss & Quinlan, Winesburgh 1, se sw sw 20-14n-5w	¶2.25	1292
W. E. Ross, Slocum 1, se nw se 28-16n-3w	¶6.0	1256
Montcalm County—		
Belvidere Oil Co., Ackley 1, se sw ne 21-12n-7w	*	1283
Homer Fulton, Spencer 1, sw sw nw 13-10n-5w	*	3211
Daily Crude Oil Co., Parker 1, nw ne ne 29-12n-9w	*	3360
Osceola County—		
Taggart Bros. Co., Raymond 4, c sw 25-18n-10w	¶5.0	1200
Ottawa County—		
Smith Pet. Co., Moelker 2, ne ne sw 1-6n-13w	5	1902

Mississippi

Yazoo County (Tinsley Dome)—		
Love Pet. Co., Germany A-1, 30-10n-2w	480	5050
Union Prod. Co. & Texas Co., Childress A-2, 24-10n-3w	840	4623
Union Prod. Co., Sims 2, 30-10n-3w	720	5055
Woodruff A-1, 11-10n-3w	216	4920
Jones-Berry Unit 1, 25-10n-3w	912	4910
Perry A-1, 25-10n-3w	432	4644

Nebraska

Dakota County—		
P. S. Kriver, Armour 1, nec 33-28n-8e	*	1300

New Mexico

Eddy County—		
Brewer Dr. Co., Hoffman 1, sw se sw 24-18s-26e	85	1175
Emperor Oil Co., Puckett 9, c se nw 24-17s-31e	50	3976
Green Bay Oil Co. et al, State 1, c n½ nw ne 2-17s-31e	*	4005
Stroup-Yates et al, Ballard 1-B, nec sw 8-18s-29e	35	2671
Eddy County (Wildcat)—		
Dooley & Haynes, Martin 1, c se nw 9-19s-25e	*	1000
Lea County (Langlie)—		
Continental et al, Sholes 1-B-19, c se sw 19-25s-37e	¶12.0	2945

New York

Allegany County—		
Franchot Oil Co., Murphy farm, Bolivar	6	1452
Hardman & Thompson, Hazard farm, Wirt	7	1360
Reynolds, Funk et al, Neff farm, Wirt	5	1365
Bradley Prod. Corp., Duke farm, Alma	5	1470
Fitz and Carrol farm, Bolivar	5	1364
Sawnet Oil Co., Merritt farm, Genesee	7	1436
Forest Oil Co., Ackerman farm, Bolivar	7	1372
William F. O'Connor farm, Genesee	8	1384
A. L. Shaner, June farm, Bolivar	6	1462
WATER INTAKE WELLS		
Allegany County—		
Mary M. Scott, Scott farm Bolivar	...	1420
Bradley Prod. Corp., Duke farm Alma	...	1472
Roy E. Vossler, McEnroe farm, Alma	...	1339

Ohio

Athens County—		
Bern O. & G., Rebrasier 1	¶ 0.6	1109
Snyder et al, Gaston 3	¶0.04	1035
Cuyahoga County—		
Benedum-Trees, Lockemer 1	¶0.53	2820
Holmes County—		
Ohio Fuel Gas, Yoder 1	¶0.31	4153
Knox County—		
Allen Willey, Hammond 1	¶0.68	2761
Licking County—		
Copperhead O. & G., Thompson 2	12	603
Allen Willey et al, Strickey 1	¶ 1.0	2590
Ohio Fuel Gas, Wilkins 2	¶0.79	2146
Gall Early, Branhold 1	¶0.48	2398
Lorain County—		
Wm. Dempsey, McHenry 1	*	2527
Meigs County—		
Pure Oil, Hamm 1	¶0.07	3265
Bowman & Denning, Heath 1	¶0.04	425
C. P. Bowman, Jones 2	¶0.03	1695
Muskingum County—		
Gas Prod. Co. of O., Bailey 1	¶1.05	4185
Perry County—		
Preston Oil, Thompson 1	275	3195
Cookson 1	178	3323
Winegardner 1	50	2765
Ohio Fuel Gas, Cotterman 1	¶0.16	3035
Boning 1	*	2785
Stark County—		
East Ohio Gas, Greer 2	¶1.02	4641
Summit County—		
East Ohio Gas, Nemes 1	¶0.15	4245
Wayne County—		
Kemrow Co., Kean 2	¶0.59	3003
OLD WELL DEEPENED		
Athens County—		
C. W. Nuzum, Willett 1 (otd 1042)	¶0.04	1035
WATER INPUT WELLS		
Medina County—		
R. C. Holmes et al, Hostettler 12-W	...	500
Hostettler 13-W	...	464

Oklahoma

Bryan County—		
Pure, Little (106) 3, sw ne nw 34-5s-7e	2344	5065
Caddo County—		
Palmer, Dixon 5, nw nw se nw 35-6n-10w	735	3420
Creek County—		
Dunn & Miller, Anthis 2, ne nw se 34-14n-10e (pb 3298)	40	3301
Link, Kinch 1, ne sw ne 25-16n-7e	*	3839
Garvin County—		
Cox & Hamon, Craig 4, nec nw 32-1n-3e (pb 2497)	45	2575
Grady County—		
Olahoma Nat., Edmondson 4, c w½ sw nw 23-5n-8w	¶90.0	4526
Jackson County—		
Minor, Minor 3, se nw nw 15-1n-20w	*	1628
Kiowa County—		
Gled, Watkins 3, sw nw nw 20-7n-17w	¶2.0	940
Lincoln County—		
Elco O. & G. Co., Ralka 1, sec nw 5-14n-5e (pb 3545)	57	3549
Garfield County—		
Champlin, Rudolph 1, c w½ sw ne 23-23n-6w	45	6316

United States Well Completions—*Continued*

OKLAHOMA—Continued

Company, Well and Location	Init. Prod. Bbls.	Depth
Okfuskee County—		
Kewanee, Replogle 1, ne nw ne 2-10n-8e	160	3500
Burke-Greis, Mullins 1, sw se se 5-10n-10e	*	3366
Shell, Taylor 1, swc 26-12n-8e	328	3681
McMahon, Edwards 1, sec 27-12n-8e	160	3718
Droppleman, Dill "C" 8, nw se se 34-12n-8e	520	3588
Oklahoma County—		
Thompson, Cary 1, sw nw se nw 34-12n-3w	730	6550
Okmulgee County—		
Dunn et al, Fisher 1-A, swc nw 7-12n-12e	¶2.5	3412
Newman et al, Hance 1, se nw nw 20-14n-14e	*	3093
Osage County—		
Mizel, Osage 7, se nw sw 28-23n-9e	140	2280
Pawnee County—		
Greives, Armstrong 1-A, sw ne nw 23-20n-7e	¶3.0	2638
Pittsburgh County—		
Utilities, Bascob 1, c ne se 10-7n-18e	¶5.5	2065
Pottawatomie County—		
Bay, Porter "B" 1, ne se sw 24-7n-3e	*	4551
P. Traugh, McCook 1, sw ne se 5-7n-4e	*	4116
Hilton Phillips, Cherry 3, se nw sw 21-7n-4e	460	4294
Seminole County—		
Newson, Smith "B" 1, nw se ne 20-7n-6e	205	2350
Love, Abbott 2, ne se ne 33-8n-7e (pb 3210)	40	3257
Alma, Borden 1, ne se nw 4-8n-8e (pb 3366)	25	4326
Stephens County—		
Halliburton, Fee 1, se sw sw 5-1s-7w (experimental well)	*	990
OLD WELLS DEEPENED		
Carter County—		
Sun, Apple-Franklin 2, nw ne se 8-4s-3w (otd 1073)	*	1412
Creek County—		
Bruin, Morton "A" 1, nwc se 27-14n-10e (otd 2700)	45	3336
McClain County—		
Patsy, Bond 1, nec 16-5n-3e (otd 3600)	*	3940
Oklahoma County—		
British American, Hayes-Highland 1, nw se ne se 22-12n-3w (otd 6502)	741	6591
Alta Vista 1, nw se nw sw 23-12n-3w (otd 6486)	252	6581

Pennsylvania

Company, Well and Location	Init. Prod. Bbls.	Depth
BRADFORD DISTRICT		
Bradford Tr. Co., 18 wells	18	....
Forest Oil Corp.	1	....
Forest Pet. Corp.	1	....
Niagara Oil Corp., 3 wells	3	....
NEW YORK-PENN GAS FIELD		
Rogers et al, Bart Harder	*	....
MIDDLE DISTRICT		
M. C. Winlack, Winlack Producers	¶	....
SOUTHWEST DISTRICT		
Fayette County—		
Wahler Powers, Rockwell 2	¶0.06	2300
Greene County—		
Equitable Gas, Kerr 1	¶0.14	3768
Westmoreland County—		
Peoples Nat. Gas, McCreary 2	¶0.38	3177
WATER INTAKE WELLS		
Bradford District—		
Penn Valley Crude Oil Corp., Fee 2	...	....
Forest Oil Corp., 2 wells	...	....
Forest Pet. Corp., 2 wells	...	....
D. Y. M. Corp.	...	....

West Central Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Callahan County—		
Earl Johnson et al Hickman 4	*	499
Coleman County—		
Robt. McKissick et al, Owens 1	256	3597
Eastland County—		
G. A. White et al, Pierce 1	125	2658
Jones County—		
Hedrick Oil Co., Ikard 1-E	380	2141
Humble, Huddleston 1-B	768	3016
Shackelford County (Wildcat)—		
Geo. McCamey & Robt. Nail, Cook 1	*	903
Shackelford County—		
J. P. Ray et al Barbough-Ghio 2	5	594
Stanfield & Tubbs, Clark 3	10	626
Stewart & Echert, Gray 1	*	171
Wittmer O&G Prop. et al, Nail 2	15	1406
Taylor County—		
S. & B. Oil Co., Richards 1	114	2414

East Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
E. Constantin & Co., Cary-Thompson 5 (18.45-ac)	120	3576
Kilgore Area—		
J. B. Holcomb et al, Clayton 3-A (7¼-ac)	900	3544
Thos. D. Humphrey, Spear 32 (20.37-ac)	600	3575
Spear 34 (20.37-ac)	600	3574
Spear 35 (20.37-ac)	600	3575
Shell, Elder 14-B (73-ac)	3000	3604
Longview Area—		
General Crude Oil Co., Rembert 14 (89.27-ac)	1200	3495
Guiberson Oil Corp., Christian 2 (4.46-ac)	5000	3461
L. G. & S. Oil Corp., McQueen 9-C (138-ac)	960	3642
Magnolia, Free 39 (169.3-ac)	960	3668
White 30 (80-ac)	4000	3534
Margay Oil Corp., Victory 18 (87-ac)	3600	3639
Mudge Oil Co., Free 19-A (104.7-ac)	5000	3706
Trapp & Blankenship, Fenn 2	3500	3601
John Wrather et al, Alexander 3 (50-ac)	600	3604
Anderson County (Long Lake)—		
Alex McCutchin et al, Evans 1	74	5285
Camp County (Pittsburg)—		
Gulf, Venters 1	71	8107
Franklin County (Talco)—		
Humble, Young 4	612	4302
Leon County (Wildcat)—		
H. A. Lindsay et al, White 1	*	6060
Wood County (Hawkins)—		
Humble, Bryan 1	¶2.7	4495
Shelby County (Joaquin-Logansport)—		
Southern Prod. Co., Anderson 1, Robertson sur	¶52.0	5064

EXPERIENCE... ACHIEVEMENT

During our 16 years of making and interpreting gravity surveys all over the world, we have been fortunate in pioneering the development of many of today's producing oil fields.

GRAVITY METER EXPLORATION CO.
TORSION BALANCE EXPLORATION CO.

W. G. Saville J. P. Schumacher A. C. Pagan

830-2 Shell Bldg. Houston, Texas

A VALUABLE ALLY to the DISCOVERERS of OIL

The NATIONAL BANK OF COMMERCE

Gulf Building Houston

"The Bank of Courtesy"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

United States Well Completions—*Continued*

Texas Panhandle

Company, Well and Location	Init. Prod. Bbls.	Depth
Carson County—		
Skelly Oil Co., Schafer 115	349	3088
Gray County—		
L. S. Hobbs et al, Davidson 1	†	3120
King Oil Co., South Vollmert 8	216	3265
Wilcox O&G Co., Combs-Worley 49	189	3064
Hutchinson County—		
Cree-Hoover et al, Harvey Sisters 8	153	3041
Phillips Pet. Co., Haile 12	222	3077
Shell, Harvey Sisters 15	101	3076

West Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Cochran County (Slaughter)—		
Atlantic Ref. Co., Boyd-Humble 5	549	5069
Magnolia, Woodley 3	872	4992
Crane County (Sand Hills)—		
Gulf, Waddell et al 19	2376	4473
Waddell et al 20	5962	4550
Ector County (Foster)—		
Continental, Johnson 6-B	448	4212
Johnson 7-B	850	4306
Forest Dev. Corp., Moss 5-H	351	4300
Lee Dr. Co., Johnson 13	164	4330
Geo. P. Livermore et al, Johnson 2-35	513	4153
Ector County (Goldsmith)—		
Gulf, Goldsmith 343	660	4227
Ector County (North Goldsmith)—		
M. A. Grisham et al, Cowden 4, sec 4	166	4501
Gaines County (Wasson)—		
Continental, Langdon 4-43	1110	4994
Moore 7-45	938	5050
Hockley County (Slaughter)—		
Aweob Oil Co.,-Bond Oil Corp., Barry 5	1344	5005
Mid-Seale 4-A	994	4975
Delta Dr. Co., Slaughter 2-A	303	4996
Fain & Riner, Soash 1	273	4988
Geo. P. Livermore et al, Glimp 4	952	5032
Sid Richardson et al, Slaughter 3-B	342	4972
Slaughter 4-B	983	4990
Western States Gaso. Corp., Frazier 7	2202	5003
Mitchell County (Northwest)—		
K. A. Ehman et al, Strain 1-B	332	1790
Pecos County (Taylor-Link)—		
Dave Breeding et al, University-Humble 7-J	85	1691
Pecos County (Tobarg)—		
Stanolind, Smith 7-B	89	410
Pecos County (Walker)—		
J. M. Odom et al, White-Baker 2	118	2081
Pecos County (White-Baker)—		
Cardinal Oil Co., White-Baker 3-A-45	45	1715
Scurry County (Sharon)—		
Pearson-Sibert Oil Co., Bishop 2	177	2460
Upton County (Gulf-McElroy)—		
Gulf, McElroy 240	1819	2917
Ward County—		
Acme O. & Roy. Co., Sloan-Shell 4	259	3034
Gulf, O'Brien 162	411	2700
Hutchings 154	519	2795
Winkler County (Keystone)—		
Ralph Lowe et al, Campbell-Texaco 6	409	3258
Yoakum County (Wasson)—		
Aloco Oil Co., Miller-Texaco 12-B	871	5200
Willard-Texaco 12-A	529	5196
Basin States Oil Co., Jordan-Honolulu 6	839	5284
Mabee O&G Co., Kiel 2	813	5285
Magnolia, Mahoney 26	617	5185
Oil Dev. Co., Willard 15-763	1197	5270
OLD WELL DEEPENED		
Winkler County (Kermit)—		
Magnolia, Walton 72 (otd 2922)	50	3220

North Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Archer County (Griffin-Kadane)—		
Deep Oil Dev. Co. et al, Griffin 1	704	4385
Archer County (Hull-Silk Deep)—		
Magnolia, Rutty 17-B	1533	4603
Archer County (Hull-Silk)—		
Blackwell & Helmerich-Payne, Wilson 12	936	3980
J. A. Chapman et al, Wilson 1	1104	3795
Pet. Producers Co., Johnson 3-A	1008	4389
Archer County (McCrory)—		
Fain-McGaha Oil Corp., Wilson 2-G	*	4790
Archer County (Wildcats)—		
Burma Pet. Co., Lemmon 1	*	1350
Panhandle Ref. Co., Colgan 1	*	1602
Archer County—		
E. P. Bowen et al, Portwood 1	*	1476
C. T. Hedges et al, Harmel 18-C	8	1283
J. C. Stinnett et al, Fee 3	18	720
W. R. Worthington et al, McLelland 3	15	1190
Baylor County (Cowan)—		
British American O. P. Co., Cowan 2	104	2547
Baylor County (Wildcat)—		
Hattie B. Madden et al, James 2	*	2317
Clay County (Antelope)—		
Shell, Wright 2	486	3235
Clay County (Wildcat)—		
Bridwell Oil Co., Myers 1	*	6065
Cooke County—		
C. & L. Oil Co., Perkins 20	20	778
Harvey Dr. Co., Sicking 4	276	1308
High Point Oil Co., Fette 1	141	1101
Montague County (Rogers & Rogers)—		
Rogers & Rogers, Astley-Texaco 6	1328	5400
Stanolind, Hill 2	*	5440
Wichita County (Wildcat)—		
Bridwell Oil Co., Parker 1	*	1825
Wichita County (K-M-A)—		
Golding & Cochran, Preston 9	456	3998
Shell & Phillips Pet. Co., Preston 15-A	712	3967
Tide Water et al, Ferguson 22	448	3827
Wichita County—		
Perry Browning et al, Simpson 1	75	1765
R. H. Larsen et al, Karrenbrock 1	*	675
A. R. McElreath & Suggett, Turner 1	*	1249
Wilbarger County (Fargo)—		
Amerada, Harrell-Magnolia 1 (pb to 4324 ft)	1008	4593
Wilbarger County—		
Christie-Hickman Dr. Co., Waggoner Est. 3	*	1949
W. B. Omohundro et al, Waggoner Est. 2-B	*	2218
Staley-Wynne et al, Waggoner Est. 22-G	95	2434
Wilbarger County (Wildcat)—		
Ray Bros. et al, Streit 1	†	2278
Young County (Wildcat)—		
Mason & Hibbs, Leberman 1	*	701
Young County—		
C. J. Bohner et al, Prideaux 1	*¤	511
L. T. Burns et al, Rogers 7	210	898
Rogers 8	96	898
Falcon Co., Turner 1	*	4006
Walter Gant et al, Simms 1	750	3697
J. T. Harrell et al, Rogers 2-A	*	934
Horwitz & Oldom, Graham 18	*	680
Kimmell, Lee & Co., Campbell 5-B	152	975
Campbell 6-B	*	981
J. W. Sparks et al, Clark 8	*	932
Clark 10	*	932
H. B. Wallace et al, Clark-Texaco 1	*	883
E. D. Willis et al, Stewart 1	18	860
P. B. Worthington et al, Clark 6	*	949
Rogers 4	*	902

Southwest Texas

CORPUS CHRISTI DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Aransas County (Wildcat)—		
Humble, St. Charles Bay-State 1, tr 27, cntr of bay, 2 mi ne Lamar	*	10,341
Calhoun County (Duck Bay)—		
Coronado Corp, State-Duck Bay 20(153)	500	5664
Hidalgo County (Nichols)—		
Royal O&G Corp., St.L.B.&M Ry Co. 1	500	4528
Jackson County (Lolita)—		
Magnolia, Hinshaw 6	625	5936
Jackson County (West Ranch)—		
Louis Crouch, Brewer 3	700	5808
Phillips Pet., Toney 5	1250	5820
Seaport, Stepan 2	250	5808
Jackson County (LaWard)—		
Humble, Strauss 1, extends prod. ¾ mi se	900	5225
Jim Wells County (Orange Grove)—		
Cities Service, Schueneman 1	550	5100
Jim Wells County (Wade City)—		
Atlantic, Mueller 4	500	4809
Nueces County (East Flour Bluff)—		
Humble, Flour Bluff-State 1-J	625	7407
Nueces County (Stratton)—		
Corpus Christi Corp., Wardner 17	¶100.0 & 100	6608
Southern Minerals, Stratton-Community 12	650	6625
Nueces County (South Clara Driscoll)—		
Texas Conservation, Huie 2, extends prod 1 mi s	475	6025
Refugio County (McFaddin)—		
Barnsdall, Marberry 7	500	5665
Refugio County (Wildcat)—		
Southern Minerals, Wood et al 1, 349-ac lse, Anastacio Reojas sur, 2 mi ne Woodsboro, opens Woodsboro fld	85	5908

LAREDO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Duval County (Charamousca)—		
Magnolia, Duval Co. Rch. Co 5(288)	60	1535
Duval County (Wildcat)—		
Sun, Black 1, James House sur 6, 3 mi ne Fitzsimmons fld	*	4607
Jim Hogg County (Colorado)—		
Humble, King Ranch-Colorado 10-B	360	2974
McMullen County (Wildcat)—		
Argo, Edrington 1-G, AB&M sur 63, 1½ mi s Campana fld	*	3131
Webb County (West Cole)—		
O. W. Killam, Volpe 1	*	2511
Zapata County (Glen)—		
Buffalo, Hinnant 3-F	*	2173
OLD WELL DEEPENED		
Zapata County (Lopena)—		
American Texas, Ramirez 1 (otd 2095)	¶25.0	2550

SAN ANTONIO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Lee County (Wildcat)—		
Shell, Brown 1, Amasa Burchard sur, 2 mi s Tanglewood	*	6067

Texas Gulf Coast

Company, Well and Location	Init. Prod. Bbls.	Depth
Brazoria County (Lochridge)—		
Shell, Ramsey Prison Farm B-9	322	6381
Brazoria County (Old Ocean)—		
Harrison & Abercrombie, B.R.L.D B-1	630	10,268
Sun, Reynolds 1	421	10,800
Stanolind, Schantz 1	446	10,933
Chambers County (Barbers Hill)—		
Texas Gulf, Davis 1-A	473	4727
Hardin County (Old Batson)—		
Ada Bell O. Co., Honeymoon 293	8.5	880
Harris County (Wildcat)—		
O. J. McCullough, Swilley 1	*	4510
Liberty County (Wildcat)—		
Dishman & Lucas, Robertson 1	*	7510
Liberty County (Hull)—		
Gulf, Phillips 28	105	3082
Lee County (Wildcat)—		
Shell, Brown 1	*	6070
Wharton County (Withers)—		
Texas Co., Pierce C-91	122	5348

West Virginia

Company, Well and Location	Init. Prod. Bbls.	Depth
Calhoun County—		
O. R. Hardman & Rou Hildreth, Bush 1	2	2108
Gilmer County—		
Carnegie Nat. Gas, Maxwell 2	¶ 0.6	1753
Bruce Haney et al, Butcher 1	¶0.03	2100
Kanawha County—		
United Carbon, Haynes 1	¶4.21	4938
Godfrey L. Cabot, McLean Hrs. 6	¶0.23	5105
Mingo County—		
McKinley Trent, Tr., Stepp 3	¶0.26	2046
Putnam County—		
Jackson Gas Co., Rupe 2	¶2.02	1725
Ritchie County—		
Clem S. Morris, T. V. Cunningham 1	¶0.15	1969
Pitts. O. & G. Co., Coyle Hrs. 3	¶0.03	1705
A. E. Dye Hrs. O. & G. Co., Dye Hrs. 3	*	1820
Wayne County—		
United Fuel, Blankenship 4985	¶0.26	2978

R. W. LAUGHLIN L. D. SIMMONS

WELL ELEVATIONS

LAUGHLIN-SIMMONS & CO.

(Mid-Continent Region)

GENERAL OFFICE: OKLAHOMA BUILDING, TULSA, OKLAHOMA

WILDCAT REPORT
New Starts and Completions

ARKANSAS
FIRST REPORT

Columbia County—Phillips' Warnock 1, c sw nw 1-17-20, rig for Smackover lime test, contract to Crescent Dr. Co.

COMPLETIONS

St. Francis County—U. S. Oil Corp.'s Wilford 1, se ne 29-4n-1w, elev 204 ft, so & sg, abnd 2265 ft.

CALIFORNIA
FIRST REPORTS

Kern County—Ohio Oil's KCL-G-1, sec 36-29-26, rig, McClung area.

Los Angeles County—Hathaway Co.'s Ram 1, sec 31-5-17, rig, Castaic area.

San Bernardino County—Prado Oil Corp.'s Lamp 1, Pine & Euclid Sts, rig, Chino area.

Sacramento County—Amerada Pet. Corp.'s Wilcox 1, sec 31-4-3, sp, Rio Vista area.

Ventura County—Gordon Norell's Dixie 1, sec 15-2-17, lcn, Santa Susana area.

COMPLETIONS

Kern County—Richfield Oil Corp.'s Tejon Ranch 1, sec 2-10-19, td 10,940 ft in siltstone, top Olcese 4420 ft, basalt 5625-6510 ft, abnd, Grapevine area. White River Explor. Co.'s Salsa 1, sec 7-25-28, td 1610 ft, (core hole) no casing, abnd, Richgrove area.

KANSAS
FIRST REPORTS

Barton County—Derby Oil Co. et al's Heinz 1, c w½ sw sw 10-18-11w, mim.

Graham County—Kerlyn & Phillips et al's Francis 1, c w½ nw se 31-19-17w, rur.

McPherson County—Continental et al's Conrad 1, se sw ne 31-19-5w, dr.

Russell County—Wakefield et al's Cook 1-A, c e½ se ne 26-13-15w, lcn.

COMPLETIONS

Leavenworth County—McLaughlin & Sons' Thorp 1, c ne ne 27-10-20e, 4 mi s Oskaloosa pool, Mississippi 1395-1742 ft, 70,000 ft gas sd 1359-60 ft, Hunton 1793 ft, Viola 1965 ft, Wilcox 2088 ft, Arbuckle 2163 ft, abnd 2209½ ft.

Marion County—Rex-Morris et al's Kappan 1, c n½ nw ne 16-18-4e, between Lost Springs and Propp pools, Mississippi 2409 ft, abnd 2461 ft.

Rice County—Sharon Dr. Co. et al's Nevious 1, swc ne 21-19-10w, 1 mi n Silica pool, new pool, Topeka 2550 ft, Lansing 2963 ft, Arbuckle 3273½ ft, td 3298 ft, pb 3248 ft, 30 perf 3032-40 ft, pay 3040½-42 ft, 500 gals acid, 530 bbls, 40.8-gr.

Stafford County—Landon & Faulkner et al's Shaffer 1, c w½ nw sw 2-31-13w, 3¼ mi se Hiss pool, Topeka 2880 ft, Lansing 3279 ft, Simpson 3510 ft, Arbuckle 3536 ft, td 3552 ft, 2000 gals acid, 1175 bbls, 30.5-gr.

Sumner County—Benedum-Trees Oil Co.'s Landwehr 1, c e½ se se 17-32-1e, 1 mi e Wellington, Stalnaker 2668 ft, Lansing 2995 ft, Mississippi 3594 ft, Simpson 4050 ft, Arbuckle 4127 ft, abnd 4200 ft.

NORTH LOUISIANA
FIRST REPORT

DeSoto Parish—Schubert Oil Corp.'s Scott 1, se 29-14n-14e, rig.

COMPLETION

Catahoula Parish—H. L. Hunt's Southern Kraft 1, c se se 19-10n-6e, abnd 5215 ft.

SOUTH LOUISIANA
FIRST REPORT

Plaquemines Parish—Phillips Pet. Co.'s LL&E-Fee 1, 1½ mi ne LL&E-State 1, Bastian Bay area, sec 38-20s-29e, lcn.

COMPLETION

St. Martin Parish—Shell's State 1, sec 1-15s-11e, Duck Lake pros, abnd 11,205 ft, log had kick at 10,964-983 ft.

MICHIGAN
FIRST REPORT

Gratiot County—Chartiers Oil Co.'s Grubaugh 1, sw sw sw 6-11n-3w, rig.

COMPLETIONS

Allegan County—Lang & Lewis, Inc.'s Moore 1, sw sw ne 28-1n-14w, Traverse 1255 ft, abnd 1261 ft.

Isabella County—Burruss & Quinlan's Winesburgh 1, se sw sw 20-14n-5w, Stray sand 1285 ft, td 1292 ft, 2,200,000 ft gas, new pool.

MISSISSIPPI
FIRST REPORT

Perry County—Fred E. Courson's Newman Lbr. Co. 1, ne nw 21-2n-10w, mat for 7500-ft test.

NEBRASKA
FIRST REPORT

Richardson County—Transcontinental Oil, Inc., et al's Hebenstreit 1, c nw sw 8-2n-16e, mim.

NEW MEXICO
FIRST REPORTS

Eddy County—Whiting-Grant et al's Howell 1, sw nw se 32-20s-26e, lcn.

Lea County—J. W. Brown, Inc.'s State 1, center lot 11, 4-16s-35e, lcn.

Sierra County—Barney Iorio et al's Fee 1, c nw nw 25-14s-5w, sp.

COMPLETION

Eddy County—Dooley & Haynes, Martin 1, c se nw 9-19s-25e, abnd 1000 ft.

OKLAHOMA
FIRST REPORTS

Jefferson County—H. J. Brown et al's Lowery 1, nw sw nw 8-3s-5w, pits.

Lincoln County—Morgan-Gulf Prod. Co.'s School Land 1, ne sw ne 16-12n-5e, dr.

Okfuskee County—Malernee et al's Beard 1, se sw ne 7-11n-8e, dr.

Muskogee County—Stormfeltz et al's Weimer 1, nw sw nw 16-13n-16e, mach.

Pawnee County—Harwell & Burroughs et al's Isaacs 1, nw sw se 25-20n-6e, dr.

COMPLETIONS

Logan County—Sunray et al's Donoghue 1, c nw se 7-17n-1w, Guthrie pool disc, Pawhuska 2000 ft, Deer Creek 2265 ft, LeCompton 2475 ft, Upper Hoover 2500 ft, Lower Hoover 2625 ft, Oread 2885 ft, Avant 3470 ft, Dewey 3570 ft, Perry gas sand 3670 ft, Hogshooter 4100 ft, Layton 4130 ft, Checkerboard 4170 ft, Lower Checkerboard 4380 ft, Mississippi 5066 ft, Woodford 5080 ft, Misener 5132 ft, Hunton 5155 ft, Sylvan 5171 ft, Viola 5260 ft, Dense 5300 ft, Dolomite 5334 ft, first Wilcox 4350-69 ft, Marshall zone 5382-84 ft, Second Wilcox 5425-5445 ft, td 5445 ft, 2444 bbls 42-gr.

Stephens County—Halliburton's Fee 1, se sw sw 5-1s-7w, Duncan townsite, experimental well for testing electric log, sand show gas 707-18 ft, sand show oil 800-06 ft, so 905-47 ft, broken sd 947-60 ft, abnd 990 ft in shale.

TEXAS GULF COAST
COMPLETIONS

Harris County—O. J. McCullough's Swilley 1, 3 mi s Sheldon, Victor Blanco sur, show gas 4222-47 ft, not tested, abnd 4510 ft.

Lee County—Shell's Brown 1, Tanglewood area, Finney sur, dst 5920-48 ft, show 1 bbl oil & 4 bbl sw, dst 5978-89 ft show oily mud & sw, abnd 6070 ft.

Liberty County—Sun's (Dishman & Lucas Robertson 1, 50.6-ac tr, A. M. Lejarza sur, abnd 7510 ft.

EAST TEXAS
FIRST REPORTS

Fannin County—H. W. English et al's Parkhurst 1, nw part 80-acre tr and M. P. Davis sur, dk.

Houston County—C. C. Dixon et al's Texas Long Leaf Lbr. Co. 1, J. Chears sur, dk.

COMPLETION

Leon County—H. A. Lindsay et al's White 1, west cor 160-ac tr and McKinney-Williams sur, elev 309 ft, Pecan chalk 4148-53 ft, Austin chalk 5254-5490 ft, abnd 6060 ft in shale.

WEST CENTRAL TEXAS
FIRST REPORTS

Callahan County—E. E. Yates & L. M. York's Huestis 1, nec nw TE&L sec 3198, lcn.

Coleman County—L. J. Derrick et al's Vance 1, sw se E.T. Ry. sec 101 sp & sd, A. P. Heinze et al's Whittington 1, nwc se T&NO Ry. sec 4, lcn. McMillen & Rominger's Wilkerson 1, nw part 55-ac tr, GH&H Ry. sec 3, blk 2, mim.

Palo Pinto County—W. K. Gordon et al's Nolan 1, se se T&P Ry. sec 86, blk 3, lcn.

Shackelford County—Aragon Oil Co.'s Walls Pasture 1, c s½ e½ sec 39, Orphan Asylum Lands, sp. Cecil Young et al's Simpson 2, ne sw sec 13, Blind Asylum Lands, sd 650 ft.

COMPLETION

Shackelford County—Geo. McCamey & Robt. Nail's Cook 1, ne nw sw E.T. Ry. sec 53, blk 10, elev. 1533 ft, abnd 903 ft.

WEST TEXAS
FIRST REPORTS

Andrews County—Mascho Oil Co.'s Fisher 1, c ne se PSL sec 16, blk A-36, sp, & sd.

Ector County—M. D. O'Quinn et al's T. P. Land Trust 1, near sec nw T&P sec 31, blk 44, T-3-S, lcn.

Winkler County — Stanolind - Westbrook-Thompson Hold. Corp., Hendrick 1, c nw nw PSL sec 18, blk B-26, rur.

TEXAS PANHANDLE
FIRST REPORT

Potter County—R. & J. Dr. Co. et al's Pavillard 1, sec sw AB&M sec 10, blk 2, mim.

NORTH TEXAS
FIRST REPORTS

Archer County—Geo. W. Cooper et al's Edwards 1, nec lot 20, Geo. Bruner sur, mim for 5000-ft test. Fresno Oil Co.'s Hammond 1, se cor H. Corzine sur, lcn.

Clay County—Bridwell Oil Co.'s Myers 2, C. Thompson sur A-444, mim for deep test.

Wichita County—Jennings & Beavers' Cooper-Huffines 1, H. Hastie sur A-98, sp.

Wilbarger County—H. F. Wilcox O&G Co.'s

INDUSTRIAL SCIENTIFIC, INC.

Announces

the purchase of Industrial Scientific Supply Company, a Division of Fort Worth Laboratories. There is no change in personnel, and the same accounts are being handled under the new ownership, as follows:

Taylor Instruments — B. & A. Reagent Chemicals

Pyrex and Kimble Glassware — Marsh Gauges

Oil Testing and Miscellaneous Laboratory Apparatus

INDUSTRIAL SCIENTIFIC, INC.

FORT WORTH
824 Monroe St.
Phone 3-9321

HOUSTON
1302 Dallas Ave.
Phone P-7040

B. H. WILSON **ROY E. O'NEILL** **FRED WELLBORN**

D'ARCY M. CASHIN
CONSULTING GEOLOGIST AND PETROLEUM ENGINEER
705 NATIONAL STANDARD BUILDING
HOUSTON TEXAS

J. P. McKEE
Consulting Geologist
300 BITTING BUILDING
WICHITA, KANSAS
Telephone 2-7213

MARVIN LEE
Petroleum Geologist
BITTING BUILDING
WICHITA, KANSAS
Phone 3-8941

Triangle Blue Print & Supply Co.
Represents
Spencer Microscopes
Haloid "Seismic" Paper
12 W. 4TH ST. TULSA, OKLA.

TULSA CAMERA RECORD COMPANY
PHOTOSTAT COPIES
BLUE PRINTS
ENGINEERING SUPPLIES
CITY MAPS
KODAKS
SUPER-PHOTO COPIES
MOVIE CAMERAS
317 South Boston, TULSA, OKLAHOMA
Phone 3-7166
H. N. MASONER, Manager

Waggoner Est. 1, sec sw H&TC sec 43, blk 2, lcn for 5000-ft test.

Young County—E. L. Orr et al's Laird 1, se sw TE&L sec 1393, lcn. G. Willard Rich et al's Furr 1, sw se TE&L sec 37, lcn.

Completions

Archer County—Burma Pet. Co.'s Lemmon 1, nw nw blk 3, Meade Pasture subd, Gunsight lime 1232-39 ft, abnd 1350 ft. Panhandle Ref. Co.'s Colgan 1, m/s/se cor E. L. Ry. sur A-688, Gunsight 1508-12 ft, abnd 1602 ft.

Baylor County—Mrs. H. B. Madden et al's James 2, nec lot 15, T&NO sec 150, abnd 2317 ft.

Clay County—Bridwell Oil Co.'s Myers 1, C. Thompson sur, Bend 5486 ft, Mississippian 5997 ft. Ellenberger 6038 ft, abnd 6065 ft.

Wichita County—Bridwell Oil Co.'s Parker 1, near c blk 16, leag 34, Palo Pinto CSL sur, Gunsight 1750-51 ft, abnd 1825 ft.

Wilbarger County—Ray Bros. et al's Streit 1, S. N. Gosnell sur, A-1231, jkd 2278 ft.

Young County—Mason & Hibbs' Leberman 1, sw sw TE&L sec 271, abnd 701 ft.

SOUTHWEST TEXAS

FIRST REPORTS

Bexar County—Dr. L. L. Skaggs' Gurinsky 1, 35.9-ac tr, F. E. Morales sur, 7 mi sw San Antonio, 800-ft test, lcn.

Caldwell County—Ogden & Riddle's Perry 1, 77.3-ac lse, Wm. House sur, 9 mi n Luling, 3000-ft test, Ogden rig, lcn.

Duval County—Hiawatha O&G Co.'s Parr 31, 3920-ac lse, San Andres gr, 2500 ft se Parr 30, e extension well, 6000-ft test, lcn. Magnolia's Weil 3(1-563), BS&F sur 563, 1363.51-ac lse, 1 mi w Hoffman fld, 2900-ft test, co rig, lcn.

Jim Hogg County—Sal Vieja Oil Co.'s Pena 2, blk 46, J. Keoughan subd, sur 578, 400-ac lse, 22 mi sw Hebbronville, 3200-ft test, lcn.

La Salle County—Holland Oil Co.'s Cartwright Est et al 1, lot 25, blk "B", Geo J. Greer subd, 6000-ft Wilcox test, Henderson Coquat, cont, wor.

Milam County—T. Y. McCormick's McGuire 1, 100-ac lse, Jose Leal gr, 3 mi n Minerva, 700-ft test, lcn.

Starr County—W. R. Davis & Co. Inc.'s Davenport 1-C, sur 920, 326-ac tr, 5000-ft Vicksburg test, lcn.

Victoria County—W. Stewart Boyle's Fox 1, 40 ac out of 179.80-ac lse, blks "D" & "E", Victoria 4-lge gr, 3400 ft w Victoria fld, 5250-ft test, orig, abnd 2-8-40 by Sewell & Smith, taken over by Boyle to test 3400-ft sd.

Webb County—Transwestern Oil Co.'s de la Garza Est 1, Jose G. de La Garza sur 680, 160-ac lse, 7 mi ne Oilton, 2500-ft test, lcn.

Zapata County—R. M. Moore's Vela 1, 4500-ft Wilcox test, Howard Skaggs, cont, old well abnd abt 2500 ft by Roy Smith et al, w of Lopena fld.

COMPLETIONS

Aransas County—Humble's St. Charles Bay-State 1, tr 27, cntr of bay, 2 mi ne Lamar, abnd 10,341 ft.

Duval County—Sun's Black 1, James House sur 6, 3 mi ne Fitzsimmons fld, abnd 4607 ft.

Jackson County—Humble's Strauss 1, 532.5-ac lse, Clare lge, 21 bbls per hr, ¼-in ch, 275 lbs tp, td 5225, t/sd 5218, extends La-Ward prod ¾-mi se.

Lee County—Shell's Brown 1, Amasa Burchard sur, 2 mi s Tanglewood, Edwards 5925 ft, abnd 6067 ft.

McMullen County—Argo's Edrington 1-G, AB&M sur 63, 1½ mi s Campana fld, Cole 1912, Pettus 3038 ft, abnd 3131 ft.

Nueces County—Texas Conservative's Rule 2, sec 127, Paul's subd, Driscoll rnch, 102 bbls, 11/64-in ch, 200 lbs tp, 475 lbs cp, perforated 5620-25 ft 16 shots, 38.3-gr. no wtr, low gas/oil ratio, td 6025 ft, t/sd 5615 ft, extends South Clara Driscoll fld 1 mi s.

Refugio County—Southern Minerals' Wood et al 1, 349-ac lse, Anastacio Reojas sur, 2 mi ne Woodsboro, 85 bbls oil, 215 bbls sw per day, ¼-in ch, 550 lbs tp, 1575 lbs cp, td 5908 ft, opens Woodsboro fld.

Webb County—O. W. Killam's Volpe 1, blk 14, sur 693, 110-ac lse, abnd 2511 ft.

Tenney Creek Spacing

A new spacing rule issued by the Texas Railroad Commission will allow wells to be drilled 200 feet from lease lines and 400 feet apart in the Tenney Creek field, Caldwell County.

LEASE FOR SALE—Offer very attractive producing oil lease, investment $100,000.00; no trade. P. O. Box 194, Austin, Texas.

William M. Barret, Inc.
Consulting Geophysicists
Specializing in Magnetic Surveys
Contracts accepted for domestic and foreign projects, using the most improved instrumental and interpretative technique.
GIDDENS-LANE BUILDING
SHREVEPORT, LOUISIANA

H. F. SMILEY
PETROLEUM GEOLOGIST
624 Hamilton Building—Phone 2-4446
WICHITA FALLS, TEXAS

Hershal C. Ferguson
CONSULTING GEOLOGIST AND PALEONTOLOGIST
1208 ESPERSON BLDG. • HOUSTON, TEXAS

J. BRIAN EBY
CONSULTING GEOLOGIST
1406 STERLING BUILDING
HOUSTON TEXAS

JOHN C. MYERS
Consulting Geologist
NIELS ESPERSON BLDG.
HOUSTON, TEXAS

THE FORT WORTH LABORATORIES
Analysis of oil field brines, cores, gas, oil, and minerals. Field gas testing. R. H. Fash, Vice-President; Long Distance 138. 823½ Monroe Street, Fort Worth, Texas.

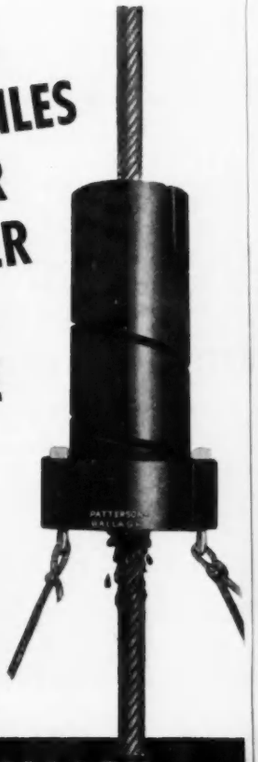
HOUSTON LABORATORIES
Analytical and Consulting Chemist
Podbielniak Gas Analysis
Oil Field Brines, Waters and Cores
Complete Evaluation of Crude Oils
Long Distance 267, Box 132, Houston, Texas

PATENTS
Patents, Trade Marks, Copyrights and Infringement Litigation
HARDWAY & CATHEY
428-29-30 Bankers Mortgage Bldg.
Phone Capitol 9756 Houston, Texas

The Firm of
JACK A. SCHLEY
ATTORNEYS AT LAW
PATENTS - INFRINGEMENTS - OPINIONS
1801-3 Commerce Bldg. — Houston
1807-11 Tower Petroleum Bldg. — Dallas
San Antonio — Washington, D. C.

ONE OPERATOR SAID:

"OUR WIRE LINE TRAVELLED 125 MILES THRU THIS WIPER BEFORE THE WIPER WAS DISCARDED. WE WOULDN'T BE WITHOUT ONE."



A CLEAN LINE ENCOURAGES INCREASED EFFICIENCY OF CREW

PATTERSON-BALLAGH CORP.
Los Angeles, Houston, New York City

See Composite Catalog

PATTERSON-BALLAGH WIRE LINE WIPER

Finest Subway Entrance to all Points of Interest

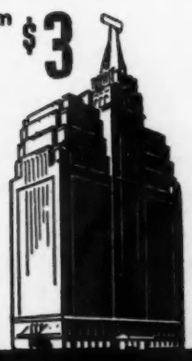
New York's Popular

HOTEL LINCOLN

44TH TO 45TH STS. AT 8TH AVE.

OUR CHOICEST ROOMS From $3

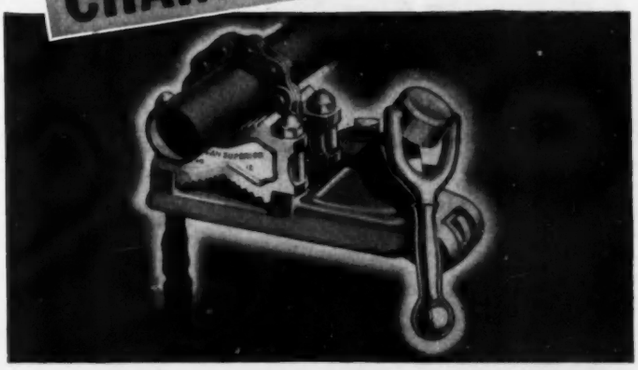
1400 ROOMS each with Bath, Servidor, and Radio.
* Four fine restaurants awarded Grand Prix 1940 Culinary Art Exhibition.



MARIA KRAMER
PRESIDENT
John L. Horgan
Gen. Mgr.
HOTEL EDISON
SAME OWNERSHIP

IN THE CENTER OF MID-TOWN NEW YORK

WILLIAMS
SUPERIOR DROP-FORGED TOOLS
"VULCAN" CHAIN PIPE VISES



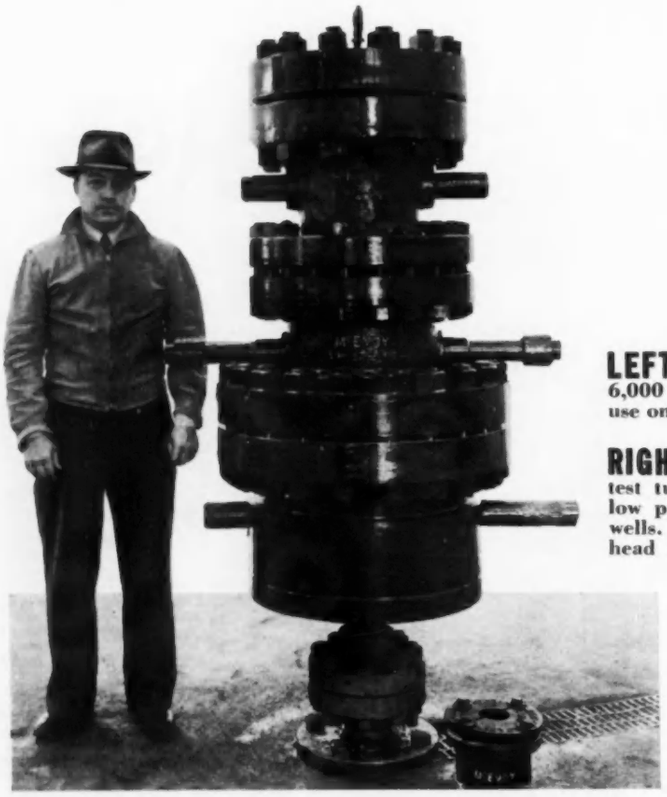
Three dependable Williams' Vises. *"Vulcan* Superior" (top) with adjusting handle on top and jaws reversible for double service life. Made in 2 sizes for pipe, ⅛ to 4½ inches.

"Vulcan" (left), the *original* chain pipe vise —small, compact, positive in grip. Made in 4 sizes for pipe, ⅛ to 8 inches.

"Vulcan" Clamp Kit Vise (right)—easily carried—clamps anywhere. Weighs only 5¾ lbs. For pipe, ⅛ to 2 inches.

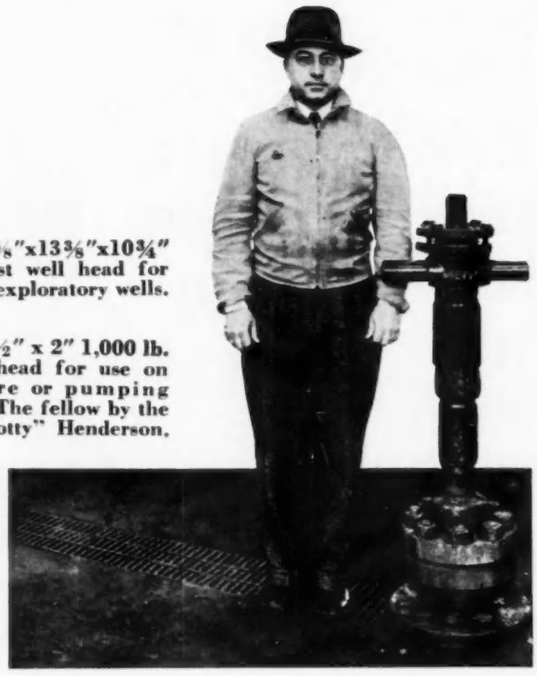
Write for complete Williams' catalog, or see our advertisement in the Composite Catalog. Buy from your supply store.

J. H. WILLIAMS & CO. 225 Lafayette St. **NEW YORK**



LEFT: 18⅝"x13⅜"x10¾" 6,000 lb. test well head for use on deep exploratory wells.

RIGHT: 5½" x 2" 1,000 lb. test tubing head for use on low pressure or pumping wells. P. S.: The fellow by the head is "Scotty" Henderson.



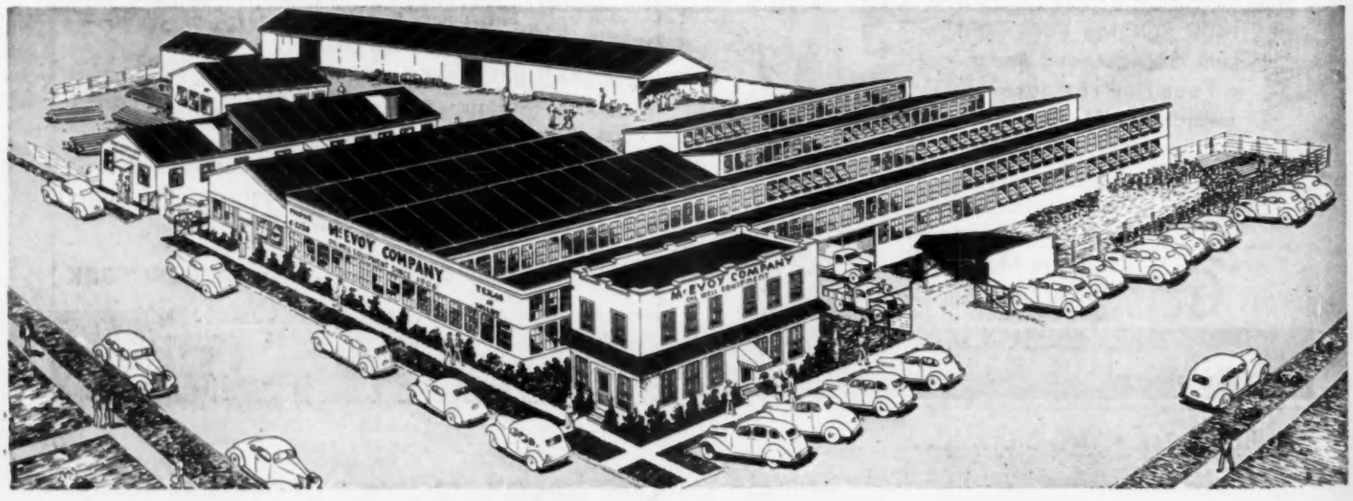
From the Largest to the Smallest

. . . McEvoy makes safe, dependable Completion Equipment for YOUR well

IF YOUR WELL is the deepest, highest pressure well ever drilled, McEvoy has safe, dependable well heads and bottom-hole equipment that assures perfect safety during every step of completion. If your well is a shallow pumper you can get *low cost*, dependable completion equipment from McEvoy. Try McEvoy equipment on your wells. See for yourself how perfectly McEvoy equipment does its job and how promptly McEvoy delivers this equipment. McEvoy Company, Texas at Milby, Houston, Texas; Export Office, 30 Church Street, New York, N. Y.

Sold through leading supply stores everywhere

McEVOY COMPANY



MEN IN THE INDUSTRY'S NEWS

GILBERT M. WILSON, for the past four years with Depthograph Company, working in California and Mid-Continent fields, last week joined the editorial staff of THE OIL WEEKLY. A graduate of the University of California at Los Angeles with a degree in petroleum geology, he took post graduate work in petroleum and production engineering at that school and at the University of Southern California. His work during the past four years included tests to determine fluid levels, fluid densities, bottom-hole pressures, productivity factors or indices, well potentials for engineering and proration purposes, and general well performance and reservoir problems. Following a month in California, he will make his headquarters in Houston.

CHARLES H. HOEFER has been made general superintendent of The Duraloy Company, Scottdale, Pennsylvania. He was formerly superintendent of the Alloy Division, Lebanon Steel Foundry, and also superintendent of The Forging and Casting Corporation Division of Allegheny Ludlum Steel Company, and Empire Steel Castings, Inc.

P. W. APPLEBY, West Texas drilling contractor, is president of Appleby & Guthrie, Inc., a new concern with headquarters at Odessa, Texas. Roberts Guthrie and C. R. Appleby are vice presidents, and George L. Guthrie is secretary-treasurer.

H. B. DUCHAND, Republic Petroleum Company, is president of the Petroleum Forum, organized last week by a group of executives of the California oil industry to provide a common meeting ground for cultivation of a better understanding of oil industry problems and to discuss differing points of view.

Other officers are J. K Wootan, Sunset Oil Company; R. A. Broomfield, Jr., Barnsdall Oil Company, and G. S. Follansbee, Universal Consolidated Oil Company, vice presidents; W. A. Weiss, Lloyd Corporation, recording secretary; D. P. Murdy, Wilshire Oil Company, corresponding secretary; and A. E. Bell, Jr., A. E. Bell Corporation, treasurer.

GARMAN KIMMELL, engineer for Black, Sivalls & Bryson, Inc., Oklahoma City, will address members of the Tulsa section of American Society of Mechanical Engineers April 14 at a dinner meeting in Fullers Cafeteria at 6 p.m. His subject will be "Testing Distillate Wells by Means of Portable Trailer Laboratory."

HARRY McCOBB, head of the production department of Standard Vacuum Oil Company in the Dutch East Indies, has left San Francisco to return to the Dutch East Indies after spending a vacation in the United States.

G. D. GROCE, who has been connected with the automotive industry in a manufacturing and engineering capacity for many years, and for the past 10 years service manager for Cleveland Tractor Company, last week was named general service manager for The Buda Company. He will make his headquarters at the company's general offices at Harvey, Illinois.

R. L. BOGGS, assistant to the president of Mene Grande Oil Company, is expected to arrive in New York from Caracas, Venezuela, on April 27. He will be on vacation.

H. J. LANDIS, head of the accounting department, production division, Gulf Oil Corporation, has returned to New York from Venezuela, where he has been on a periodic inspection visit.

LEE H. HILL, who has been head of the transformer department of Allis-Chalmers Manufacturing Company since 1936, has been named assistant manager of the company's electrical department and given general supervision of the department's sales promotional activities. He served two years as instructor in electrical engineering at Cornell University immediately following his graduation from that institution; became associated with Westinghouse Electric & Manufacturing Company as transformer design engineer and as engineer in charge of power transformer development. For several years he was manager of the transformer division of American Brown Boveri Company, joining Allis-Chalmers Manufacturing Company in 1931 when it absorbed the former company.

GEORGE BERLIN, Skelly Oil Company, Pampa, Texas, was elected chairman of the Mid-Continent District, American Petroleum Institute's Division of Production, when the organization held its annual spring meeting at Amarillo March 21-22. He succeeds Tom J. Hamilton, Mid-Continent Pump Supply Corporation, Oklahoma City.

Other officers are L. R. Pickrell, T. C. Johnson, Inc., Wichita, vice chairman for Kansas; Herbert G. Goodpaster, Kerlyn Oil Company, Oklahoma City, vice chairman for Oklahoma; R. C. Kay, Amarillo, vice president for Texas, and H. W. Ladd, Stanolind Oil & Gas Company, Tulsa, secretary-treasurer.

Members of the advisory committee are Henry E. Miller, Lario Oil & Gas Company, Wichita, chairman; M. N. Perkins, Phillips Petroleum Company, Phillips, Texas; E. O. Bennett, Continental Oil Company, Ponca City; George Hoisington, Halliburton Oil Well Cementing Company, Wichita; W. B. Berwald, The

New Officers of Mid-Continent District, API Division of Production

GEORGE BERLIN
Chairman

L. R. PICKRELL
Vice Chairman

H. R. GOODPASTURE
Vice Chairman

R. C. KAY
Vice Chairman

H. W. LADD
Secretary-Treasurer

THE GEOTECHNICAL CORPORATION

Roland F. Beers
President

★

1702 Tower Petroleum Building
Dallas, Texas
Telephone LD 711

★

Research Laboratory
580 Massachusetts Ave.
Cambridge, Mass.

OIL & GAS WELL
TORPEDOES
Special Equipment for Trouble Shooting

All shots safely and accurately placed with the Howard Greene Line Indicator. Patentee of the Bolshevick Greene Cave Catcher.

Our Modern Equipment and Experience Is Your Guarantee of

Safety - Accuracy Satisfaction

***Dial* 8-4875**

W. C. Duncan . . . 5-7366
Gordon H. Greene . . . 5-9980

HOWARD GREENE TORPEDO CO.
5501 North Eastern
Oklahoma City, Okla.

Ohio Oil Company, Tulsa; J. S. Freeman, Skelly Oil Company, Tulsa; T. J. Hamilton, Oklahoma City; N. M. Hutchinson, Cities Service Oil Company, Bartlesville, Okla.; J. H. Stewart, The Atlantic Refining Company, Tulsa; T. C. Johnson, Wichita; C. F. Alford, Humble Pipe Line Company, Pampa, Texas; M. J. Kirwan, Indian Territory Illuminating Oil Company, Bartlesville; D. R. Knowlton, Phillips Petroleum Company, Bartlesville; R. H. Lynn, Kerlyn Oil Company, Oklahoma City; M. N. Mahaffey, Cities Service Oil Company, Eldorado, Kansas; H. V. Matthews, Stanolind Oil & Gas Company, Pampa; Earl Blackburn, J. M. Huber Corporation, Borger, Texas; John Millar, Sinclair-Prairie Oil Company, Great Bend, Kansas; J. F. O'Shaughnessy, Lario Oil & Gas Company, Wichita; M. Harrell, The Texas Company, Wichita; W. G. Ricketts, Amerada Petroleum Corporation, Tulsa; A. S. Ritchie, McPherson Drilling Company, Wichita; R. S. Knappen, Gulf Oil Corporation, Tulsa; C. D. Watson, The Carter Oil Company, Tulsa; H. E. Zoller, Derby Oil Company, Wichita; C. H. Keplinger, Shell Oil Company, Wichita; C. O. Moss, Deep Rock Oil Corporation, Tulsa; Walter Biery, Sinclair Refining Company, Pampa; A. J. Beagle, Deep Rock Oil Company, Pampa; W. M. Saxon, The Pure Oil Company, Tulsa, and Frank Pickell, Stanolind Oil & Gas Company, Tulsa.

H. S. WILLIAMS last week was named chairman of the executive committee of the Independent Oil Producers Association of Illinois. Committee members are Barron Kidd, John W. Russell, A. R. Thompson, S. Alden Perrine, J. H. Steinmesch, J. D. Sanford and J. A. Matthews.

The legislative committee consists of Thompson, C. J. Haas, G. H. Blankenship, E. J. Coyle, J. B. Whisenant, Steinmesch and Sanford. Membership and finance committee consists of Russell and Sanford.

Members of the publicity and public relations committee are Blankenship, chairman; E. W. Ellsworth and Matthews. Taxation matters are being handled by Kidd, chairman; Merle Becker, Donald L. Glass, Jack Coyle and J. I. Dilsaver.

L. A. ESTES has been elected president of South Chester Tube Company, succeeding the late Gustavus W. Cook. Estes was formerly executive vice president. John W. Lawton, continuing as secretary, has also been elected Treasurer, succeeding Francis J. Tucker, who is joining the sales department as special representative.

BEN J. FORTSON, 32, Oklahoma City and Fort Worth oil producer, was killed March 26 in an auto accident near Chickasha, Oklahoma. He was associated with Sam W. Polk, Fort Worth, in operation of properties in Shackelford County, Texas.

E. E. BROSSARD, executive assistant in the Caracas, Venezuela, office of Mene Grande Oil Company is in Madison, Wisconsin, on his vacation. He expects to return early in April.

JAY E. JONES, 43, Oklahoma City oil operator, was found dead at his home on March 21.

A. I. LEVORSEN
Petroleum Geologist

★

221 WOODWARD BLVD.
TULSA, OKLAHOMA

CECIL HAGEN
GEOLOGIST

★

2530-31 GULF BUILDING
HOUSTON, TEXAS

ALEXANDER DEUSSEN
GEOLOGIST

★

SHELL BUILDING
HOUSTON, TEXAS

Cummins and Berger
Petroleum Geologists

★

1603 Trinity Building
Fort Worth, Texas

PUT YOUR WELL BACK ON PRODUCTION

THE KINLEY SCREEN SHOT OPENS *CLOGGED SCREENS*

Assuring 100% opening of original perforations

Section of retrieved screen showing screen wrapping forced away from original openings without damage to liner.

WRITE, OR CALL TODAY

M. M. KINLEY CO.
Explosive Engineers

OIL WELL SHOOTING OF ALL KINDS

Day W-1221 Night H-2064
301 ADAMS HOUSTON

★ Oil Well Fire and Blowout Service ★

You're $'s Ahead!

YORK
RECONDITIONED PIPE AND EQUIPMENT
has plenty of service

When you get pipe and equipment from us you can be sure it has been reconditioned. Pipe is thoroughly checked, scaled, threads reworked and new couplings applied if necessary.

Quality merchandise at lowest prices.

DAY AND NIGHT SERVICE

OILFIELD SUPPLY CO., INC.
YORK

Houston, Texas
Woodcrest 6-8301

Lake Charles, La.
Phone 3664

You furnish the well - Let us do the rest.

O. W. VAN PETTEN, Columbian Carbon Company, Charleston, West Virginia, is chairman of the program committee for the spring meeting of the Eastern District, American Petroleum Institute's Division of Production, scheduled for April 17-18 at Pittsburgh. He was engaged in the contracting business, railroad construction and highway construction from 1914 to 1917, after taking a course in civil engineering at the University of Illinois. He served as a first lieutenant in the Thirty-Sixth Field Artillery during World War I, joining Louisville Gas & Electric Company as superintendent of natural gas production following the war. In 1928, he joined Hope Engineering Company to work on development of natural gas properties, and in 1932 joined Columbian Carbon Company.

Members of the committee are: K. C. Cottingham, The Ohio Fuel Gas Company, Columbus; Bart DeLaat, The Pure Oil Company, Olney, Illinois; F. E. Eckert, Hanley & Bird, Bradford, Pennsylvania; F. H. Finn, People's Natural Gas Company, Pittsburgh; M. R. Joy, Cities Service Oil Company, Mt. Pleasant, Michigan, and R. J. Sullivan, The Carter Oil Company, Mattoon, Illinois.

W. A. Watkins, The Carter Oil Company, Mattoon, is chairman of the registration committee.

V. F. Bowyer, Peoples Natural Gas Company, as chairman of the arrangements and entertainment committee, is being assisted by J. V. Goodman, Equitable Gas Company, and P. L. Kesel, Carnegie Natural Gas Company. All are of Pittsburgh.

M. G. Gulley, Gulf Oil Corporation, Pittsburgh, publicity committee chairman, is being assisted by I. W. Hartman, Gordon Oil Company, Mt. Pleasant, Michigan, and E. H. Tollefson, Hope Natural Gas Company, Clarksburg, West Virginia.

REDFORD BOND, chairman of the Oklahoma Corporation Commission, will discuss "The Oil Industry Can Meet Requirements Without Dictatorship" before the Seminole Chapter of the American Petroleum Institute's Division of Production March 31. C. F. Fisher, superintendent of gasoline plants for Cities Service Oil Company, will speak on "Natural Gasoline Industry—Seminole Area." The meeting will open with a dinner at 6:30 at N. K. Cafe, Seminole.

HERMAN GUNTER, Florida state geologist, gave a paper on "Stratigraphy and Structure of Florida" recently before the Mississippi Geological Society. He was accompanied to Jackson by Sydney A. Stubbs, with the Florida Geological Survey, who entered into the discussion following presentation of the paper.

W. W. TOMES has been appointed head of the flow meter section of Cochrane Corporation. A 1928 graduate of Purdue University, he has been associated with Firestone Tire & Rubber Company in

ASHTON GAUGE
Pressure Ranges to 10,000 Lbs.

The Chrome Vanadium Steel pressure element or spring is carefully bored, turned and formed, heat treated and tempered and processed to prevent corrosion. Screwed case for oil field service.

Immediate Delivery from Large Houston Stocks.

MECO

MAINTENANCE ENGINEERING CORPORATION
P. O. Box 2637 Phone P-3135
HOUSTON, TEXAS, U. S. A.

Forward!
with QUAKER HOSE

Progressive Quaker has it—HOSE for all types of Oil Handling—each brand developed and built to give the utmost in service and dependability.

Quaker is better prepared than ever before to supply its share of Mechanical Rubber Goods that the Oil Industry needs and demands.

● ***Specify Quaker*** on all your rubber requirements for real service and economy.

✓ Belting
✓ Packings
✓ Hose

WRITE • WIRE • ORDERS

Consult Pages 2072 and 2073 in The Composite Catalog

QUAKER RUBBER CORPORATION
PHILADELPHIA

Houston Chicago Memphis
New York Buffalo San Francisco

MEN IN THE INDUSTRY'S NEWS

flow measurement and steam distribution work and, more recently, in meter field engineering and sales work. He will be assisted by W. C. Morrison, formerly with Brooklyn Union Gas Company as a sales engineer. Morrison attended the University of North Carolina, and graduated from Brooklyn Polytechnic Institute in 1936.

WORTH B. ANDREWS, SR., and Worth B. Andrews, Jr., Fort Worth operators, have returned from a two-week business trip to Los Angeles.

ROBERT S. KERR, president of Kerr-Lynn Company, Oklahoma City, discussed "Some Observations with Respect to the Problems and Future of the Oil Industry in the Mid-Continent Area" at the March dinner meeting of the Petroleum Accountants Society, Tulsa.

LEO E. JOHNS, engineer for The Carter Oil Company, has resigned to accept a position in the industrial engineering department of Vega Airplane Company at Burbank, California.

It's a Fact — Johnston

A GAS WELL – SAID TO BE THE WORLD'S LARGEST – WAS BROUGHT IN RECENTLY IN THE CHICKASHA FIELD OF GRADY COUNTY, OKLAHOMA. THE WELL PRODUCED IN SUCH VOLUME THAT ORDINARY GAUGING DEVICES FROZE AT 198,000,000 CUBIC FEET PER DAY. ONLY AFTER SPECIAL HEATING EQUIPMENT AND IMPROVED BUREAU OF MINES INSTRUMENTS WERE INSTALLED DID THE OPERATOR OBTAIN AN ACCURATE RATING OF THE WELL – 438,000,000 CUBIC FEET DAILY! THIS IS SUFFICIENT TO SERVE THE ENTIRE METROPOLITAN REQUIREMENTS

OF A CITY OF MORE THAN A MILLION PEOPLE.

WHETHER OR NOT YOUR NEXT WELL TURNS OUT TO BE A WORLD'S RECORD PRODUCER, YOU'LL WANT TO KNOW THE EXACT PRODUCTION CAPABILITIES OF EVERY ZONE YOU DRILL. AND BY USING THE JOHNSTON FORMATION TESTER YOU CAN KNOW... BEFORE CASING IS SET... WHICH ZONES ARE WET OR DRY, WHICH WILL PRODUCE OIL OR GAS. THE JOHNSTON TESTER – BY BAILING THE HOLE DRY IN AN INSTANT AND TESTING THE WELL UNDER ACTUAL PRODUCING CONDITIONS – GIVES YOU A CLEAR-CUT, ACCURATE PICTURE OF EVERY LIKELY ZONE IN YOUR WELL. IT SAVES CASING, TRANSPORTATION AND TIME... INSURES MORE EFFICIENT AND COMPLETE DEVELOPMENT OF EVERY WELL YOU DRILL.

WRITE FOR JOHNSTON ENGINEERING BROCHURE 33-B. IT ILLUSTRATES AND DESCRIBES IN DETAIL JOHNSTON TESTING METHODS AND EQUIPMENT, AND WILL BE SENT WITHOUT OBLIGATION ON REQUEST.

Johnston

Submitted by: BEN ALTMAN, TULSA, OKLAHOMA

$$$ FIVE DOLLARS ($5.00) WILL BE PAID FOR EACH INTERESTING OR UNUSUAL FACT CONCERNING THE PETROLEUM INDUSTRY (EITHER IN THE UNITED STATES OR ABROAD) WHICH IS USED IN THIS SERIES OF JOHNSTON ADVERTISEMENTS. SUBSTANTIAL PROOF MUST ACCOMPANY EACH CONTRIBUTION. WHEN TWO OR MORE SIMILAR FACTS ARE SENT IN, THE AWARD WILL BE GIVEN TO THE FIRST ONE RECEIVED ...

M. O. JOHNSTON
Oil Field Service Corp.
3117 SAN FERNANDO ROAD — Albany 0186
LOS ANGELES, CALIFORNIA
Bakersfield 2794 — Ventura 5621

FORMATION AND CASING TESTING — JOHNSTON

JOHNSTON
Oil Field Service Corp.
5702 NAVIGATION BLVD.
HOUSTON, TEXAS

"WHY SET CASING BEFORE YOU KNOW!"

RAYMOND A. PETERSON, vice president in charge of domestic and foreign activity for United Geophysical Company of Texas, and Hugh C. Schaeffer, vice president in charge of activities east of the Rocky Mountains, are in charge of a new Tulsa office of the company established in the Thompson Building. Peterson was formerly head of the geological department of California Institute of Technology, while Schaeffer was with Mid-Continent Petroleum Corporation before 1936.

J. M. KINABREW has been named president of Standard Supply & Hardware Company, New Orleans. Other officers are Cal F. Hadden, executive vice president and treasurer; W. K. DePass, Jr., vice president and secretary; A. T. Webber, vice president, and C. E. Munden, Jr., assistant vice president.

E. V. FORAN, Houston consulting engineer, addressed the Student Section of the American Institute of Mining and Metallurgical Engineers at the University of Texas recently on "Marginal Properties in Distillate Production."

S. F. SHAW, San Antonio gas-lift engineer, last week discussed "Principles of Air-Gas Lift" before the student chapter of the American Institute of Mining & Metallurgical Engineers at the University of Texas.

GEORGE SCOTT, Technical Oil Tool Corporation, Houma, Louisiana, presented a paper on controlled vertical drilling March 18 before the student chapter of the American Institute of Mining and Metallurgical Engineers at Louisiana State University.

JOHN C. ROBBINS, Longview, Texas, and R. E. L. Silvey, Overton, Texas, have organized the Robbins, Silvey & Robbins Oil Corporation, which has a test underway in the Hawkins field. Silvey has fee land and a single lease on production in the East Texas field.

P. E. FITZGERALD, geologist and engineer for Dowell Incorporated, will discuss "Modern Methods of Field Sample Testing to Improve Acidizing" before the Tulsa Geological Society April 7. The meeting will start at 8. p.m. at Tyrell Hall, University of Tulsa.

ORVILLE T. BARNETT, engineer for Black, Sivalls & Bryson, Inc., Oklahoma City, will speak before the Tulsa section of American Welding Society on "Procedure Control of Welding," at 6:30 p.m. Friday, April 11, in the Mayo Hotel.

IRA C. JARED, JR., representative of Delta Drilling Company in Illnois and Indiana, has resigned to become industrial engineer for Gates Rubber Company, with headquarters at Kilgore, Texas.

SHELDON CLARK, vice president of Consolidated Oil Company, has been named by Governor Dwight Green as chairman of the Illinois Athletic Commission.

CARL J. TURNER, representative of Spang & Company for the past 28 years in Pennsylvania, New York, Ohio and West Virginia fields, died at his home in Butler, Pennsylvania, March 11.

Squeaks from the Bull Wheel

Heard at the Zoo

An elephant and a mouse were in the same cage at the zoo. The elephant was in a particularly ugly and truculent mood. Looking down at the mouse with disgust he trumpeted, "You're the puniest, the weakest, the most insignificant thing I've ever seen!"

"Well," piped the mouse in plaintive squeak, "Don't forget, I've been sick."

There's Good in Everything

"Polygamy would never work in this country."

"Why not?"

"Think of getting several wives in a kitchenette at one time."

Difficulties

"What's become of the Hikers' Club?"

"Oh, it disbanded. It was getting too hard to persuade passing motorists to pick us up and give us a lift."

Few Words

Lawyer: "Now, sir, did you, or did you not, on the date in question, or at any other time, previously or subsequently say or even intimate to the defendant or anyone else, alone or with anyone, whether a friend or a mere acquaintance, or, in fact, a stranger, that the statement imputed to you, whether just or unjust, and denied by the plaintiff, was a matter of no moment or otherwise? Answer me, yes or no."

Witness: "Yes or no what?"

The Evil Men Do

"Did any of your ancestors do things to cause posterity to remember them?"

"I reckon they did. My grandfather put mortgages on this place that aren't paid off yet!"

Optical "Delusion"

"I see your dear son and daughter awaiting us on the porch."

"Well, not quite. The girl in the short dress is my mother, and the young fellow in riding breeches is my wife."

Daughter!

"Who broke that chair in the living room last night?"

"It just collapsed all of a sudden, father, but neither one of us was hurt."

Pessimists

Calendar: "My days are numbered."

Needle: "I've got something in my eye."

Stamp: "I'll be licked sooner or later."

Weather Report

"What's worse than raining cats and dogs?"

"Hailing taxis."

Summer Gone

I had a little dog. I called him August. August was fond of jumping at conclusions, especially at the wrong conclusions. One day he jumped at a mule's conclusion. The next day was the first of September.

Trained

"So your daughter is about to marry. Do you really feel she is ready for the battle of life?"

"She should be. She's been in four engagements already."

Original

"Did anyone ever tell you how wonderful you are?"

"I don't believe they ever did."

"Then where'd you get the idea?"

Do As I Say, Etc.

"What's that you wrote on my paper?"

"I told you to write plainer."

One Advantage of Irrigation

"Say, this hair restorer you sold me didn't grow one hair on my head."

"Mebbe not, but it has a nice cooling effect when it runs down around your ears, hasn't it?"

Harmless Infection

"Ever have any trouble with dyspepsia?"

"Only once. That was when I tried to spell it."

Old Stuff

"Oh, Betty, you must come right over and see the gorgeous engagement ring George gave me."

"See it! I wore it all last summer."

Reconditioned

Was that your new girl I saw you with last night?

No; just the old one painted over.

Kind Policeman

It was a few days after a big party when two friends met.

"Well, old man, how did you get along after I left you—get home all right?"

"No, a confounded policeman took me to the station, where I had to spend the night."

"You were lucky. I got home."

All Error

"I have went. That's wrong, isn't it?"

"Yes, ma'am."

"Why is it wrong?"

"Because you ain't went yet."

Easy Way

"What can I do to have soft, beautiful hands?"

"Nothing, Madam, and do it all day."

New Recruit

"Does the Sergeant know about this?" inquired the Colonel as he surveyed a barricade of sandbags which had just collapsed.

"He ought to," replied a private, "he's underneath!"

Disappointment!

"John, dear, such an odd thing happened today. The clock fell off the wall, and if it had fallen a moment sooner, it would have hit mother."

"I always said that clock was slow."

Sinister Connotation

"I wish you boys wouldn't call me Big Bill."

"Why not?"

"Those college names stick—and I'm going to be a doctor."

Easily Pleased

Remember, son, beauty is only skin deep.

S'deep enough for me. I ain't no cannibal.

Gott
WATER CAN
Gotkool
WATER CANS
& COOLERS
GOTT Water Cans are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job. Snug fitting large removable top, strongly built to withstand rough usage. GOTT Water Coolers have extra large covers and a handy non-leaking push button faucet. Your Supply Store has them, get one today!
GOTT WATER CAN
Made in 1½, 3, 5, and 10 gallon sizes.
GOTT WATER COOLER
Made in 3, 5, 8, 10, and 20 gallon sizes.
H. P. GOTT MFG. CO.
WINFIELD, KANSAS
KEEP PURE DRINKING WATER ALWAYS HANDY

Do the Big 1941 Job with Less Man-killing Effort

Cut Your Pipe Easier and Faster with the Work-Saver RIDGID

RIDGID *Heavy-Duty Cutter Wheel*

RIDGID *thin blade cutter wheel, tool steel forged and assembled in steel-bushed hub*

RIDGID *Heavy-Duty Pipe Cutter*

The Defense cry is for *more* Speed! You can get it and still protect your men — with RIDGID Pipe Tools, long famous as time and labor savers — like this remarkable cutter.

That thin forged blade wheel rolls easily through pipe, with the least effort. Cuts clean, practically no burr. More cuts per wheel, less changing, lower cost. Powerful well-balanced frames, easy twirling to size. Standard and heavy-duty models; also 4-wheel cutter with special handle.

Cut more pipe but cut work and expense. . . Buy RIDGIDs at your Supply House, today!

THE RIDGE TOOL CO., ELYRIA, OHIO

RIDGID
WORK-SAVING PIPE TOOLS

COFFING "Safety-Pull" HOISTS
For every lifting and pulling job

Today's demand on every industry requires that all plants be equipped with time and labor saving maintenance and production equipment. Coffing "Safety-Pull" ratchet lever hoists are especially designed for all types of construction and maintenance work. Wherever a lift or pull is needed the "Safety-Pull" will do the job safely, quickly and economically.

SPUR GEAR Chain Hoists

Coffing builds two types of Spur Gear chain hoists. The regular Model YC, and the Cam Actuated Model "C" Two Gear hoist. These hoists are guaranteed against defective material and workmanship. Coffing Spur Gear hoists have a number of outstanding features and are factory tested at 100% over their rated capacity. Built in capacities from ½ to 4 tons, weighing only 75 to 120 pounds.

Coffing Hoist Co.
Ratchet Lever, Spur Gear and Electric Hoists
Danville, Illinois

8" HIGH PRESSURE GAS LINE

MOLOX BALL & SOCKET PIPE

Photo shows final section of three sections, totaling 22,318 feet, of 8" Molox Ball & Socket Pipe installed as submarine high-pressure gas lines under Galveston Bay, replacing pipe line of substitute material which failed in service. This is a typical example of how Mono-Cast Centrifugal Pipe, equipped with modern bottle-tight, flexible joints has set a new standard for Cast Iron Pipe serving the gas and oil industry. For complete details address Acipco office nearest you.

AMERICAN CAST IRON PIPE CO.
BIRMINGHAM, ALA.

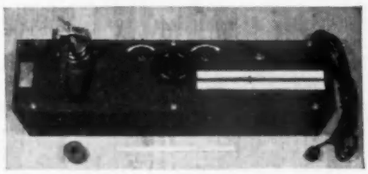
Dallas Houston El Paso Kansas City Los Angeles San Francisco Chicago Minneapolis New York City Cleveland Pittsburgh

NOTES FOR THE Equipment Buyer and User

Permeameter

ENGINEERING LABORATORIES, INC.

A permeameter that permits reading of the core directly in millidarcys when a standard core size is required, eliminating the need of calculations, has been announced by Engineering Laboratories, Inc., 624 East Fourth Street, Tulsa. For odd-shaped samples, permeability is determined by a single manipulation with length-area ratio.



Engineering Laboratories' Permeameter.

In operation, standard rubber bushings containing the core sample are clamped into the permeameter core holder. A hand wheel is turned in the direction indicated by pilot lights, being the only manual operation required in use of the instrument.

The instrument is designed to be inherently free from variations in humidity and temperature. No liquids are employed, and leveling is irrelevant. Airflow through the sample remains in the laminar region without attention of the operator.

Weight of the instrument is about 50 pounds, and it is ready for use on plugging a flexible cable into a 110-volt AC or DC socket. It is self-contained, and no external air supply is required.

Vise Bracket

JIFFYON MANUFACTURING COMPANY

A folding and removable vice bracket, designed for mounting either a pipe or machinist's vise, has been announced by Jiffyon Manufacturing Company, 1752 South Taylor Road, Cleveland Heights, Ohio.

The bracket is designed, when in working position, to provide rigid support for threading, filing, sawing and other heavy work. It locates the vise at a convenient height to provide room for use of large wrenches, pipe threading tools, or pipe cutters.

Diesel Engines

Cummins Engine Company, Columbus, Ohio, has issued a new 36-page catalog on its line of heavy-duty industrial diesel engines. It gives engineering drawings of all models, descriptions, and specifications. Included are descriptions of three diesel generating sets, and diesel-engine accessories.

Fire Fighting

Walter Kidde & Company, Bloomfield, New Jersey, has issued a wall poster on "What to do in Case of Fire." It gives brief instructions on how extinguishers should be used on each type of fire, giving basic fire fighting facts on carbon dioxide, foam, carbon tetrachloride and water-type extinguishers. It tells when each should and should not be used, and describes necessary maintenance required by each unit. Without advertising, it is designed for use as an instruction sheet to be posted on bulletin boards as safety posters are used.

Circuit Breaker

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

A new enclosed circuit breaker designed for protection of all types of light and power circuits, designated De-ion Type AB-1, has been announced by Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania. It is available in four frame sizes, in ratings from 15 to 600 amperes and in steps corresponding to commercial wire sizes. All sizes are available with ratings from 250 volts AC and 125/250 volts DC to 600 volts AC and 250 volts DC.

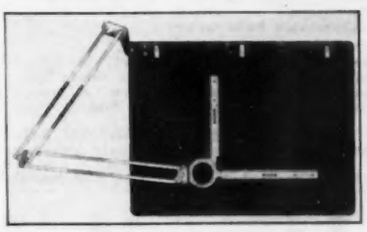
The circuit breaker features silver contacts operated by a toggle mechanism to provide a quick make-or-break action; bimetal thermal elements to prevent tripping due to harmless overloads; rust and corrosion resisting metal parts, and a method of arc quenching to confine, divide and extinguish the arc almost instantly as the contacts open, providing long contact life and reducing fire hazard.

A complete line of the breakers is available for hazardous locations classified by the national electrical code and by Underwriters Laboratories as Class I, Group D and Class II, Group G.

Drawing Machine

THE DRAFTO COMPANY

A line of portable drawing machines, taking paper sizes from 9x12 inches to 18x24 inches, has been announced by The Drafto Company, Walnut Street, Cochranton, Pennsylvania. All models are mounted on Masonite board, with parallel arms and protractor place constructed of stainless steel.



Drafto Company's Drawing Machine.

Two small models, designated Nos. 10 and 15 and taking paper sizes 9x12 and 10x15 inches, feature scales made in one piece, permanently attached to the protractor plate. The protractor for these models is graduated in 2-degree units, and clamping device is designed to provide equal locking tension at all angles to prevent slippage.

Two larger sizes, Nos. 30 and 35, have a capacity for drawings to 12x18 and 18x24 inches. Protractors are equipped with a vernier so that the machine can be set to ½-degree readings. A latching device is provided to lock the scales at 0-, 30-, 45-, 60- and 90-degree readings on either side of the 0-degree readings. Models Nos. 30 and 35 are equipped with detachable scales.

The No. 10 unit is supplied in one model,

WEIGHT INDICATOR POINTS
Accuracy . . . Sensitivity . . . Readability . . . Dependability. Do your slush pump gauges combine all these requirements? The Martin-Decker Individual and Unitized oil-filled Slush Pump Gauges do!
You get accuracy throughout the range — sensitivity adjustable to your desire. The position of the pointer is readable 40 or 50 feet away — you can know the pressure even though you can't distinguish individual figures on the dial. And dependable performance is guaranteed by the pioneer oil field instrument manufacturer—Martin-Decker!
MARTIN-DECKER CORP., LONG BEACH, CALIF.

NEW 90-UL
ECOLITE
Safety
Lantern

WITH
ALZAC PLATED
ALUMINUM
REFLECTOR

- Throws 1500 ft. beam.
- Safe in hazardous places. Tested and recommended by Underwriters' Laboratories.
- Adjustable bulb socket
- Sealed beam construction

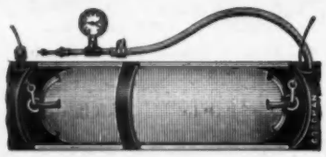
LIGHTS YOUR WAY WITH SAFETY

See this marvelous new safety lantern with broken bulb ejector and other safety features that make it the ideal lantern for hazardous locations. Now at Jobber and Supply Stores.

ECONOMY ELECTRIC LANTERN CO.
3100 W. Cherry St. Milwaukee, Wis.
Pacific Coast Office:
1818 S. Grand Ave. Los Angeles, Calif.

Standco
NO-SMOKE
STANDCO BRAKE LINING
for the easiest brake known. It "feeds off" evenly. Standco never scores brake rims. See page 2100, Composite Catalog.
Standco Brake Lining Co.
HOUSTON

STOPPERS FOR OIL LINES



Send for catalogue
SAFETY GAS MAIN STOPPER CO.
523 Atlantic Ave. Brooklyn, N. Y.

NOTES FOR THE Equipment Buyer and User

No. 15 is supplied in two models. There are three models in the No. 30 unit, and four models are included in the No. 35. All models use chromium steel with bright finish in the parallel arm assembly, with dull chromium finish employed on the protractor device. Assembly of each unit is completed with clips along the top edge to hold drawing paper and tracings.

Sterling Engine Company Starts New Buffalo Plant Construction

Construction work has started on a $500,000 addition to Sterling Engine Company's plant at Buffalo, according to Addison F. Vars, president. The new building, providing about 75,000 square feet of floor space, will be ready by September and will be used for assembling and testing of the company's Admiral engines.

Specifications call for a three-story and basement steel frame structure, with brick and tile walls, and re-enforced concrete floors. It will be 440 feet long and from 40 to 82 feet in width. A one-story and basement wing is also included. A bridge over an adjoining street will connect the old building with the new.

The third floor of the new building will be used for storage of parts and subassembly. On the second floor will be two assembly lines. To make this floor dustproof, windows will be non-operating, and fresh air will be fed in through filtered ducts.

Ten testing stands will dominate the first floor, which will also accommodate the painting and shipping departments. The engines under test will be completely enclosed; they will be operated from an adjacent control room in which test recordings will also be made. The engine test cells will be treated for both sound transmission and sound absorption.

The building will also provide office space for the plant foreman, and shower rooms for workmen, lockers, lunch space and first aid quarters will also be provided. Fluorescent lighting will be employed throughout the first and second stories.

"Exploration Geophysics," by Jakosky, in Second Printing

"Exploration Geophysics," by J. J. Jakosky, dean of the school of engineering and professor of petroleum engineering at the University of Kansas, is now in its second printing, the first having been exhausted.

The book gives detailed and practical descriptions of contemporary geophysical techniques and instruments, and includes a large number of examples from commercial surveys. It has been adopted as a class textbook by four universities.

Copies may be had from the Book Department, The Gulf Publishing Company, Box 2608, Houston, at $8 a copy.

Keratol Company Now Division Of Atlas Power Company

The Keratol Company last week announced that business, assets and good will of the company had been acquired by Atlas Power Company, and will be operated as the Zapon-Keratol Division of the latter company.

The Keratol Company organization, personnel and policies are being continued in the new division and under the same management, with headquarters at Newark, New Jersey.

Switchgear

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania, has issued Bulletin 32-160 describing heavy duty metal-clad switchgear for industrial and substation use. The units are rated at 600, 1200, 2000 and 3000 amperes for service up to 15,000 volts with interrupting capacities between 1000 and 500,000 kva. General information and distinctive features common to all units are discussed. Both indoor and outdoor types are described, attention being given to housing, control devices, elevating mechanism and oil circuit breakers. Photographs and diagrams are used to illustrate the text, and ratings and physical dimensions are tabulated.

Butterfly Valves

R-S Products Corporation, Wayne Junction, Philadelphia, has issued Bulletin 8-B, giving 12 pages descriptive of its line of standard and wafer type butterfly or blast gate valves for control of air, gas, steam and liquids. It contains data and illustrations for manual and automatic control by means of air and electric motors, solenoids, air and hydraulic cylinders. The valves are described as suitable for high temperatures as well as sub-zero refrigerating conditions.

Oil Burners

National Airoil Burner Company, 1284 East Sedgley Avenue, Philadelphia, has issued an 8-page bulletin giving general description of its line of oil burners for industry, steam boats and buildings. It illustrates typical installations, and describes operating features.

Egan WATER CANS and COOLERS

Made of copper alloy iron, with recessed bottom and of triple braced construction.

Dead air space surrounding the inner can assures effective insulation and requires a minimum of ice.

Wide mouth with close fitting flanged cover excludes dust and dirt, makes for convenience and reduces evaporation.

Extremely durable and will withstand hardest use in the field.

Sizes 1½ Gallons to 15 Gallons
AT YOUR LOCAL SUPPLY STORE

EGAN MANUFACTURING CO., EL DORADO, KANSAS

DERRICKMEN'S BELTS

A complete line of DEPENDABLE derrick belts . . . featuring the Texas Type with Quick Release Fastener. No other belt has this quick release fastener, providing for immediate release in case of emergency. Used by leading oil producers.

Write us for circular, or ask your supply store

Manufactured By
STRAUS-BODENHEIMER CO.
Houston, Texas

UNIBOLT
Trade Mark Registered U. S. Patent Office
THE ONE BOLT COUPLING

WORLD WIDE ACCEPTANCE!

★

THORNHILL-CRAVER COMPANY
HOUSTON

APPROVED SAFETY

JUSTRITE "TWIN-BULB" LANTERN

•

APPROVED U. S. Bureau of Mines

Underwriters' Laboratories

•

Pivots to any angle

See Page 1325 in COMPOSITE CATALOG, 1941

JUSTRITE MANUFACTURING CO.
2061 Southport Chicago, Ill.

A.P.I. to Issue 1941 Edition of "Petroleum Facts and Figures"

A 1941, or seventh edition of "Petroleum Facts and Figures" is to be published by the American Petroleum Institute within the next few weeks. The volume, in nearly 200 pages, will include the whole range of the petroleum industry, telling statistically how it works from oil well to service station, and where its products are used. The new edition of this reference book follows previous editions in form, but contains new tables and brings up to date, with many 1940 figures, practically all tables from the 1937 and 1939 editions.

More than 240 tables are presented in the eight sections of the 1941 volume, which has for the first time a separate section for world data. Other divisions of the book, following the major branches and operations of the petroleum industry, cover utilization, production, refining, transportation, marketing, prices and taxes, and general. The section on transportation particularly has been expanded, and will include, in addition to many new tables tracing the movement of petroleum throughout the United States, a complete list of United States tank ships of more than 500 gross tons. Gross and net tonnage, year built, owner, and cargo capacity are given.

Seven pictorial charts in color, highlighting the more important facts about each branch of the industry, are grouped in a separate section at the beginning of the volume. The first page in each section lists, with page numbers, all tables in that section.

Because of space limitations, only new and revised tables are carried back to the earliest dates. Tables which bring up to date earlier records from the fifth and sixth editions give the latest years, usually back to 1935, and refer readers to page numbers in previous editions where earlier data appear.

At least preliminary 1940 figures have been included for more than half of the tables. As far as possible, all data compiled by the various sources used up to March 15, 1941, are given; 1940 data for the remaining tables will not be available until later in 1941 and, for some tables, until 1942.

Price of the book is $1, postpaid: It may be ordered in advance of publication from the American Petroleum Institute, 50 West 50 Street, New York.

Synthetic Rubber

Hydrocarbon Chemical & Rubber Company, Akron, Ohio, has issued an 8-page booklet describing its Hycar group of synthetic rubbers. The booklet, in non-technical language, compares handling of Hycar synthetic rubber to natural rubber, describes physical characteristics, lists comparative properties, and pictures some of the steps in manufacture of the synthetic product. The company was formed last year by Phillips Petroleum Company and B. F. Goodrich Company.

Water Treatment

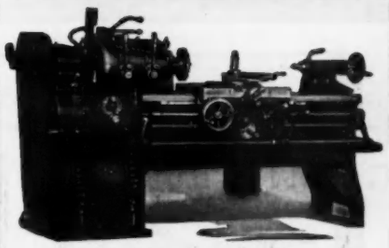
American K. A. T. Corporation, 122 East 42 Street, New York, has issued a booklet on "The Water Treatment Science of Tomorrow in Today's Engineering," explaining the theory of organic colloidal action.

For QUICK, ACCURATE TESTS
Use CURTIN CENTRIFUGES

No. 3420...15 c.c. machine. Cranks and heads interchangeable with 100 c.c. machines.

Simple in design . . . Ruggedly built . . . Require no special care . . . Gear Ratio and throw of crank produce required speed with no strain. Curtin Centrifuges meet all A.S.T.M. STANDARD METHOD D-96-35 and A.P.I. CODE NO. 25 requirements. Full descriptive literature upon request.

W·H·CURTIN & CO. Inc
HOUSTON U·S·A TEXAS



The Boye & Emmes Timken Bearing Engine Lathe

COMPLETE LINES

Machine Tools—Metal Working Machinery—Bolt and Pipe Threading Machines—Electric Arc Spot and Butt Welders—Hand Power and Electric Traveling Cranes—Foundry and Forge Shop Equipment.

C. J. HARTER, Machinery
4000 Clay, Houston, Texas
Fairfax 1466

REGISTERED PROFESSIONAL ENGINEERS

Air · Gas · Water
REPRESSURING
RECYCLING • PRESSURE MAINTENANCE
INSTALLATION • OPERATION

PETROLEUM ENGINEER
JO H CABLE
WICHITA FALLS TEXAS

GAS MEASUREMENT • PERMEABILITY
COMPRESSOR PLANTS • POROSITY
BOTTOM HOLE PRESSURE • SATURATION
GAS OIL RATIOS • RECOVERABLE OIL
CONTROL OF FLOW THRU FORMATION

REGISTERED PROFESSIONAL ENGINEERS

FITLER
"PHILADELPHIA"
CABLES

Fitler "Philadelphia" Drilling Cables are elastic, have plenty of spring, yet are hard enough to withstand the tremendous abrasive wear to which they are subjected.

Identified by the Blue and Yellow Colored Yarn Trademark (Reg. U. S. Pat. Off. No. 245091) appearing on the surface at intervals along the entire length of Cable.

Completely described in
1941 Composite Catalog

SOLD BY DEALERS EVERYWHERE

THE EDWIN H. FITLER CO.
PHILADELPHIA, PA.
Established 1804

Inexpensive
COMFORT
In
downtown
LOS ANGELES

HOTEL
CLARK

Every facility and appointment of this hotel has been planned to afford its guests the maximum of comfort and convenience. Large enough to house a thousand persons, yet small enough to permit personal service and friendliness to be truly emphasized.

• Five minutes from Union R. R. Terminal. 15 minutes from "Hollywood."

ROOMS
5 5 5
BATHS

Sensible Rates
from $2.50

ADVERTISERS THIS ISSUE

In the following index is shown only the advertisers having advertisements in this issue.

	Page
Aluminum Ore Co.	16
American Askania Corp.	92
American Cast Iron Pipe Co.	116
American Hoist & Derrick Co.	96
*American Meter Co.	97
*American Steel & Wire Co.	13
*Baker Oil Tools, Inc.	1
*Baroid Sales Division	7
Wm. M. Barret, Inc.	108
*Black, Sivalls & Bryson, Inc.	III Cover
*Byron Jackson Co.	73
Jo H. Cable	119
D'Arcy M. Cashin	108
Hotel Clark	120
*Coffing Hoist Co.	116
Columbia Steel Co.	13
*The Cooper-Bessemer Corp.	35
*Core Laboratories, Inc.	3
Crane Co.	14
Cummins and Berger	113
*Cummins Engine Co.	8
W. H. Curtin & Co.	119
DeGolyer, MacNaughton and McGhee	80
Alexander Deussen	112
*E. I. du Pont de Nemours & Co.	91
*Eastman Oil Well Survey Co.	89
J. Brian Eby	108
Economy Electric Lantern Co.	118
Egan Manufacturing Co.	118
*Engineering Laboratories, Inc.	75
*Geo. E. Failing Supply Co.	99
Hershal C. Ferguson	108
First National Bank & Trust Co.	90
First National Bank in Houston	84
*The Edwin H. Fitler Co.	120
Ft. Worth Clearing House Association	46
Ft. Worth Laboratories	108
Frick-Reid Supply Corp.	54-55
*Gardner-Denver Co.	17
*Gatke Corp.	101
General American Transportation Corp.	44
General Geophysical Co.	40
The Geophysical Co.	79
The Geotechnical Corp.	112
*H. P. Gott Manufacturing Co.	115
Gravity Meter Exploration Co.	105
Howard Greene Torpedo Co.	112
*The Gulf Publishing Co.	Insert, opposite 65
Gulf States Utilities Co.	92
Cecil Hagen	112
Hardway & Cathey	108
C. J. Harter, Machinery	119
*Haynes Stellite Co.	81
Hercules Powder Co.	12
Houston Laboratories	108
*Hughes Tool Co.	IV Cover
Humble Oil & Refining Co.	95
Independent Exploration Co.	36
Industrial Scientific, Inc.	107
*Ingersoll-Rand Co.	4
*International Harvester Co.	33
*Johns-Manville Corp.	88 and 102
*M. O. Johnston Oil Field Service Corp.	114
Jones & Laughlin Steel Corp.	II Cover
*Justrite Manufacturing Co.	119
M. M. Kinley Co.	113
Landis Machine Co.	6
*Lane-Wells Company	15
Laughlin-Simmons Co.	106
*The Layne & Bowler Co.	94
Marvin Lee	108
*A. Leschen & Sons Rope Co.	43
A. I. Levorsen	112
Hotel Lincoln	109
*Lucey Export Corp.	47
*Maintenance Engineering Corp.	113
Marmon-Herrington Co.	11
*Martin-Decker Corp.	117
McCollum Exploration Co.	85
*McEvoy Co.	110
J. P. McKee	108
*McKissick Products Corp.	98
*Merco Nordstrom Valve Co.	I Cover
*Metric Metal Works	97
*Mission Manufacturing Co.	20
Morgan Acid Incorporated	80
Mott-Smith Corp.	96
John C. Myers	108
The National Bank of Commerce	105
National Bank of Tulsa	83
*National Lead Co.	7
National Petroleum Engineering Co.	80
Norvell-Wilder Supply Co.	2
*Patterson-Ballagh Corp.	109
*Pelican Well Tool & Supply Co.	100
Petty Geophysical Engineering Co.	5
*Pittsburgh Equitable Meter Co.	I Cover
*Quaker Rubber Corp.	113
Robert H. Ray, Inc.	80
*Raybestos-Manhattan, Inc.	48
*Reed Roller Bit Co.	50-51
*The Ridge Tool Co.	116
*SKF Industries, Inc.	10
Safety Gas Main Stopper Co.	118
Jack A. Schley	108
*Schlumberger Well Surveying Co.	Insert, opposite 64
Seismic Explorations, Inc.	71
Seismograph Service Corp.	57
H. F. Smiley	108
*Sperry-Sun Well Surveying Co.	86
*Standco Brake Lining Co.	118
Straus-Bodenheimer Co.	119
Texaco Development Corp.	9
Thompson Tool Co.	82
*Thornhill-Craver Co.	119
Edgar Tobin Aerial Surveys	100
Torsion Balance Exploration Co.	106
*Tretolite Co.	93
Triangle Blue Print & Supply Co.	108
Tulsa Camera Record Co.	108
*Union Carbide & Carbon Corp.	81
United States Steel Corp.	13
Western Geophysical Co.	68
*Wickwire Spencer Steel Co.	77
*J. H. Williams & Co.	109
Wilson Supply Co.	63
York Oilfield Supply Co.	113
Youngstown Sheet & Tube Co.	18

* Indicates that detailed information on the manufacturer's products or services may be found in the 1941 edition of The Composite Catalog of Oil Field & Pipe Line Equipment.